IBM

# Asynchronous
# Communication
# Support
Version 2.0

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# Supplemental Information

## Autodial

The capability of allowing the IBM Personal Computer to automatically dial a remote computer is a function of the modem, and may not be available on the modems in your country. Autodial should not be confused with Autocall. The IBM Personal Computer does not support an EIA RS366/CCITT V.25 Autocall unit.

## Auto Answer

The Asynchronous Communications Support Program V2.0 does not use the Ring Indicator (pin 22) interface from the modem. (This indicator informs the computer when the phone is ringing.) Certain modems can be internally strapped to allow the IBM Personal Computer to simulate an Auto Answer; the IBM Personal Computer could be attached to this type of modem, but operator intervention would still be required to terminate the program. If the program is not terminated, telephone billing charges may continue due to the phone still being connected to the network.

## Unattended

The Asynchronous Communications Support Program V2.0 requires operator intervention to terminate all communications and thus the IBM Personal Computer should not be considered as an operator-less terminal.

## National Character Support

The Asynchronous Communications Support Program V2.0 will be restricted to using the US character set, which are those characters below Hex '7F'/ASCII 127. There will be no mapping performed of national to US characters. This does not prohibit the user from installing national keyboards and using National Character Support with non-communications software products.

# Asynchronous Communication Support
## Version 2.0

**Version 2.0**
**Second Edition (September 1982)**

Changes are periodically made to the information herein; these
changes will be incorporated in new editions of this publication.

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# Preface

This reference manual explains how to use the IBM
Personal Computer Asynchronous Communications
Support Program. It provides you with the following
information about the program:

- Capabilities and requirements.

- How to select and run as a terminal.

- How to connect to the Dow Jones™ Reporter[1]
  (from now on, we will refer to the *Dow Jones
  Service*) or THE SOURCE[SM 2], if you have
  subscribed to these services. (Other services
  may be available in your area. See your
  authorized IBM Personal Computer dealer for
  more information.)

- How to communicate with most VM/370 or
  MVS/TSO System Control Programs running
  on an IBM computer.

- How to create and run your own specified
  terminal.

- How to communicate with another IBM
  Personal Computer.

- How to send files back and forth between
  computers.

- How to convert ASCII files to binary, and binary
  files to ASCII.

- How to troubleshoot problems and understand
  error messages.

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[1] Dow Jones is a trademark of Dow Jones & Company, Inc.

[2] THE SOURCE is a service mark of Source Telecomputing Corporation, a
subsidiary of The Reader's Digest Association, Inc.

# Assumptions

If you are connecting to a host system, this manual assumes that you are already familiar with the terminal operation for the particular host system you are connecting to. You should refer to the host system manual to understand how to use that system. Also, this program uses some of the facilities of the IBM Personal Computer Disk Operating System (DOS) and BASIC. Rather than repeat selected portions of the IBM Personal Computer *DOS* and *BASIC* manuals, we sometimes refer you to them.

# Organization of This Manual

This manual has 10 chapters and 6 appendixes.

- Chapter 1 contains introductory information about the program, including a list of functions and features. It also describes the required hardware and software.

- Chapter 2 tells you how to copy DOS onto your Asynchronous Communications Program diskette, as well as how to load and run the program. It also describes the use of special function keys.

- Chapter 3 contains instructions for accessing the Dow Jones Service and THE SOURCE from your IBM Personal Computer.

- Chapter 4 contains information and instructions for using your IBM Personal Computer as a VM/370 terminal, and how to transfer files between your IBM Personal Computer and a host computer running on VM/370.

- Chapter 5 contains information and instructions for using your IBM Personal Computer as an MVS/TSO terminal, and how to transfer files between your IBM Personal Computer and a host computer running on MVS/TSO.

- Chapter 6 tells you how to create your own specified terminal.

- Chapter 7 discusses communicating and transferring files between two IBM Personal Computers.

- Chapter 8 contains general instructions for transferring files.

- Chapter 9 provides instructions for converting ASCII files to binary, and binary files to ASCII.

- Chapter 10 contains troubleshooting and debugging information.

The appendixes contain technical information. Unless you are an experienced programmer, you will probably only need the information in Appendix A and Appendix B.

- Appendix A lists messages that you may encounter when using the Asynchronous Communications Program.

- Appendix B contains general information about your IBM Personal Computer keyboard.

- Appendix C lists the default parameters used when you select your terminal type.

- Appendix D discusses the different communication protocols used by the IBM Personal Computer.

- Appendix E contains a list of ASCII codes and corresponding hexadecimal values.

- Appendix F provides instructions for connecting the cable between the Asynchronous Communications Adapter and the host computer or modem.

## Related Publications

- IBM Personal Computer *Disk Operating System*

- IBM Personal Computer *BASIC*

- IBM Personal Computer *Technical Reference*

- *OS/VS TSO Command Language Reference,* GC20-0646

- *OS/VS2 TSO Terminal Users Guide,* GC20-0645

- *IBM Virtual Machine Facility/370: CP Command Reference for General Users,* GC20-1820

- *IBM Virtual Machine Facility/370: CMS Users Guide,* GC20-1819

- *IBM Virtual Machine Facility/370: CMS Command and MACRO Reference,* GC20-1818

# Summary of Changes

This book has been written to help you understand and use the IBM Personal Computer Asynchronous Communications Support Program Version 2.00. It includes information on the following enhanced capabilities and improvements from Version 1.00 to Version 2.00:

- **Terminal session printing.** You can print all or part of your terminal session by pressing the F7 key.

- **Writing of host output to a file.** You can write to a file all or part of what you receive from your host system by pressing the F8 key.

- **General purpose file transfers from the IBM Personal Computer to the host.** You can use this capability to transfer files between your IBM Personal Computer and most host computers. This is now a menu selection.

- **Communications Adapter 2 support.** If you have two Asynchronous Adapter cards installed on your IBM Personal Computer, you can use either card with the Communications Program. You use Adapter Card 1 as the Primary Asynchronous Adapter and Card 2 as the Alternate Asynchronous Adapter.

- **Deletion of control characters.** You can select from a list of control characters to be deleted.

- **HELP Menu and other new features.** While operating as a terminal, pressing the F10 key shows you a list of the function keys and their purposes. Also, you can access the Dow Jones Service and THE SOURCE directly by selecting a menu item.

- **File Conversion Program.** You can use this program to convert any file into an ASCII format file that can be transmitted to a host system or another IBM Personal Computer. The program also translates such ASCII files back to the original file format with error checking.

# CONTENTS

# CHAPTER 1. INTRODUCTION

## Contents

# What Is the Asynchronous Communications Support Program?

The Asynchronous Communications Support Program (or Communications Program) turns an IBM Personal Computer with an Asynchronous Communications Adapter into a terminal that can communicate with a wide variety of computers.

# What Can You Do with It?

With your Communications Program, you can:

- Access the Dow Jones Service or THE SOURCE, if you have subscribed to these services. (Other services may be available in your area. See your authorized IBM Personal Computer dealer for more information.)

- Access most VM/370 and MVS/TSO system control programs that operate on IBM computers equipped with appropriate interface hardware. Access to these systems can be either by local cable connection or over remote common carrier (telephone) lines.

- Communicate between two IBM Personal Computers, or between an IBM Personal Computer and another personal computer, again through a local cable connection or a remote line.

- Transfer ASCII files between an IBM Personal Computer and most VM/370 or MVS/TSO systems and between an IBM Personal Computer and many other host systems.

- Specify your own terminal characteristics so the Communications Program can operate with your host system.

- Save a terminal description in a file for subsequent use.

# How Does It Operate?

The Communications Program operates in two phases, *terminal selection* and *terminal operation*.

After you load the Communications Program, the terminal selection phase begins. You are presented with a Terminal Selection Menu, from which you choose your type of terminal.

Then, you are presented with a series of menus from which you specify your terminal parameters. In the simplest case (for example, connecting two IBM Personal Computers), you need to specify only the line bit (character transmission) rate. In other cases, you may wish to define a special purpose terminal by selecting a variety of other parameters, such as parity and line turnaround characters.

Once a terminal is specified for a particular system, its definition can be stored in a file on diskette and recalled for subsequent terminal sessions.

After the terminal parameters are specified (or loaded from a file), the terminal operation phase of the program starts. In this phase, a communications link is established with another computer. The other computer is called the *host* computer.

Once this link is established, the lines of text you send while operating as a terminal, and those you receive from the host computer, are displayed on the screen of your IBM Personal Computer. Transmission and other errors are reported to you on the bottom line of the screen.

The terminal selection and terminal operation phases are discussed in more detail in the individual chapters that follow.

# What Do You Need?

You need the following hardware and software to operate the Asynchronous Communications Support Program:

- An IBM Personal Computer with at least 64K bytes of memory and at least one diskette drive.

- An IBM Personal Computer Asynchronous Communications Adapter, item number 1502074.

- A *full duplex* modem (either acoustic or direct coupled), or a direct cable connection to a host computer. (The Communications Program does not support communications using a half duplex modem.)

- A cable conforming to EIA RS-232-C Standards to connect the Asynchronous Communications Adapter to the modem or a special cable to connect directly to a host computer. See Appendix F for specific details.

- IBM Personal Computer Disk Operating System (DOS) and Disk BASIC language.

- The Asynchronous Communications Support diskette containing the following files:

  - The Communications BASIC program (TERMINAL.BAS and TERMINIT.BAS)

  - The Communications Base Program (RS232INT.EXE)

  - Terminal specification files (VMMOD.TER, TSOMOD.TER, PCMOD.TER and DOWMOD.TER)

  - Batch programs AUTOEXEC.BAT, UPDATE10.BAT, and UPDATE11.BAT, and the file MESSAGE

  - The FILECONV program to convert ASCII and binary files

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# Cable Connections

For the Communications Program to operate correctly, certain signals must be present on the cable that connects the Asynchronous Communications Adapter to the host computer or modem. For information on how to connect the cable, see Appendix F, "Cable Connections."

The output of the Asynchronous Communications Adapter conforms to the EIA RS-232-C Standard for communications between computers and external equipment. More information on the Asynchronous Communications Adapter is included in the IBM Personal Computer *Technical Reference* manual.

# Methods for Connecting to a Host Computer

Your IBM Personal Computer **running** the Communications Program can be connected to a host computer by two methods:

- A direct cable connection

- A modem connected to a telephone line (with another modem connecting the telephone line to the host computer)

When using the telephone connection, the host computer may be located thousands of miles from the IBM Personal Computer. You can use either switched or nonswitched telephone lines. Nonswitched lines, sometimes called *leased* or *dedicated* lines, are similar to WATS lines.

> **IMPORTANT:** The modem used for such a connection must operate in a full duplex mode.

# Using a Modem

## Description of Different Types of Modems

Three kinds of modems usually connect a personal computer to a host system: acoustic coupled modems, direct coupled modems without autodial, and direct coupled modems with autodial.

## What a Modem Does

A modem converts the signals from the Asynchronous Communications Adapter Card in your IBM Personal Computer to signals that can be transmitted over telephone lines. It also converts the signals received over the telephone line from the host computer into pulse signals that the adapter card can recognize.

## Using a Full Duplex Modem

You must always use a full duplex modem with your IBM Personal Computer. A *full duplex* modem is able to talk both ways (from your computer to the host and from the host to your computer) at the same time. Most modems in use today are full duplex. If you have a switch on your modem that can be set to either Full Duplex or Half Duplex, it should always be set to **Full Duplex**.

# Connecting an Acoustic Coupled Modem

An *acoustic coupled* modem uses an ordinary telephone to communicate over the telephone line. It has cups that fit the mouthpiece and the earpiece of the telephone handset. It sends audible tones through the mouthpiece and receives audible tones from the earpiece. Because it uses the handset, it does not have to be wired into the telephone line.

If you are using an acoustic coupled modem to connect to a host system, then:

1.  Connect power to the modem and turn it on.

2.  If you have either of the following switches on your modem, set them as follows:

    *   If you are the caller, set the Originate/Answer switch to **Originate**. If you are communicating with another IBM Personal Computer or terminal, the other end must be set to **Answer**.

    *   Set the Full Duplex/Half Duplex switch to **Full Duplex**.

3.  Connect the modem to the Asynchronous Communications Adapter connector at the back of your IBM Personal Computer with a cable as described in Appendix F.

# Connecting a Direct Coupled Modem without Autodial

A *direct coupled* modem connects directly to the telephone line in your room. If it does not have autodial, it will have a telephone attached to it that is used for dialing (and can also be used as a regular telephone).

If you are using a direct coupled modem without autodial to connect to a host system, then:

1.  Connect the modem to the telephone wall jack.

    Note:  Prior to the first connection of a direct coupled modem, you should contact the telephone company. In some cases, the telephone company may need to install a special cable.

2.  If you have either of the following switches on your modem, set them as follows:

    *   If you are the caller, set the Originate/Answer switch to **Originate**. If you are communicating with another IBM Personal Computer or terminal, the other end must be set to **Answer**.

    *   Set the Full Duplex/Half Duplex switch to **Full Duplex**.

3.  Connect the modem to the Asynchronous Communications Adapter connector at the back of your IBM Personal Computer with a cable as described in Appendix F.

# Connecting a Direct Coupled Modem with Autodial

A direct coupled modem with autodial usually does not have a telephone attached. To use such a modem, you must send it commands from your IBM Personal Computer. A typical command consists of some code letters (to tell the modem you want to dial) followed by the telephone number you want to dial. The modem dials the number you specify and establishes the connection to the host computer.

If you are using a direct coupled modem with autodial to connect to a host system, then:

1.  Connect the modem to the telephone wall jack.

    Note:   Prior to the first connection of a direct coupled modem, you should contact the telephone company. In some cases, the telephone company may need to install a special cable.

2.  Autodial modems have a number of switches that can be set to control their operation. In some cases, these switch settings can also be changed by commands from your IBM Personal Computer. Some common switches and their settings are as follows:

    *   If you are the caller, set the Originate/Answer switch to **Originate**. If you are communicating with another IBM Personal Computer or terminal, the other end must be set to **Answer**.

    *   Set the Full Duplex/Half Duplex switch to **Full Duplex**.

● Set the switch to force on the **Data Set Ready** or **Clear to Send** (control lines) to ON.

● Set the switch that causes the modem to echo characters you type when in the local command state to **ON**.

> Note: Sometimes with this setting, you will see double characters when you enter commands to the modem. In that case, you can either change the switch setting or ignore the double characters. Once you are connected to the host system, you should no longer see double characters. If you do see double characters, see "Meaning of Double Characters on Your Screen" in Chapter 10.

3. Connect the modem to the Asynchronous Communications Adapter connector at the back of your IBM Personal Computer with a cable as described in Appendix F.

# CHAPTER 2.  GETTING STARTED

## Contents

STARTING

# What You Must Do First

In Chapter 1, we mentioned that you would need DOS in order to run the Communications Program. The Communications Program diskette that you purchased contains only a maintenance program and the program itself. Before you can run the program, you must add some DOS programs to the Communications Program diskette.

You also need DOS if you wish to transfer files to your IBM Personal Computer during a session, because you must use diskettes formatted by DOS. However, you must use your DOS diskette to format your storage diskettes, because the FORMAT program is not copied onto your Communications Program diskette.

## Putting the DOS Support Programs onto the Program Diskette

**Note:** Putting the DOS programs onto your Program diskette is a *one-time* procedure. Once you successfully perform this procedure, you need never go through it again.

If you have already copied the DOS support programs onto your Communications Program diskette, go to "Loading the Communications Program" on page 2-8.

The procedure you are about to follow assumes you are starting with your system turned off. This procedure is divided into two sets of instructions — one set for a dual-drive system, and one set for a single-drive system. Follow the instructions for your type of system. In either case, remember to press the Enter key when you are finished typing an entry.

## Procedure for a Single-Drive System

To copy DOS from your IBM Personal Computer DOS diskette to your Communications Program diskette on a single-drive system, perform the following steps:

1.  If you have not already done so, make a backup copy of your Communications Program diskette by using the DOS DISKCOPY command. (Refer to the IBM Personal Computer *Disk Operating System* manual for instructions.) Store your original Communications Program diskette in a safe place, and work with your backup copy.

2.  Put the DOS diskette in the drive.

3.  Turn on the system.

4.  After a short period of time, you will see a message on the screen asking you to enter today's date.

    Type the date and then press the Enter ($\leftarrow$) key. For example, if today were July 6, 1982, you would enter: **7-6-82**.

    If you are using DOS Version 1.10, the system responds:

    Current time is 00:xx:xx.xx
    Enter new time:

    Enter the time in the form hh:mm:ss.xx where hh is the hours, mm is the minutes, ss is the seconds, and xx is hundredths of a second. (You can omit the :ss.xx if you wish.)

    For example, if the time were 10:45, you would enter: **10:45**.

5. If you are using **DOS Version 1.10**, you see the following message on your screen:

**The IBM Personal Computer DOS**
**Version 1.10 (C)Copyright IBM Corp 1981, 1982**

**A>**

Enter the following:

**b:update11**

6. If you are using **DOS Version 1.00**, you see the following message on your screen:

**The IBM Personal Computer DOS**
**Version 1.00 (C) Copyright IBM Corp 1981**

**A>**

Enter the following:

**b:update10**

7. You see the following message on your screen:

**Insert diskette for drive B: and**
**strike any key when ready.**

8. Remove the DOS diskette and insert the Communications Program diskette.

9. From this point, you are alternately told to insert either the DOS diskette or the program diskette several times until all the needed DOS programs are put onto the program diskette.

When the system tells you to **Insert diskette for drive A: and strike any key when ready,** insert the DOS diskette. When it says **Insert diskette for drive B: and strike any key when ready,** insert the program diskette.

2-5

Continue to follow the instructions on the
screen. When all the DOS programs are finally
on the Communications Program diskette, the
system responds:

```
Your program diskette contains
the needed DOS programs. While
you still have your DOS diskette
available, use the DOS DISKCOPY
command and make a backup copy
of your program diskette. Also,
if you intend to use the Download
function, you may need to format
some blank diskettes which you
can do now too with the DOS
FORMAT command.

A>
```

## Procedure for a Dual-Drive System

1.  If you have not already done so, make a backup
    copy of your Communications Program
    diskette by using the DOS DISKCOPY
    command. (Refer to the IBM Personal
    Computer *Disk Operating System* manual for
    instructions.) Store your original
    Communications Program diskette in a safe
    place, and work with your backup copy.

2.  Put the DOS diskette in drive A.

3.  Put the Communications Program diskette in
    drive B.

4.  Turn on the system.

5.  After a short period of time, you will see a
    message on the screen asking you to enter
    today's date.

Type the date and then press the Enter ($\leftarrow$)
key. For example, if today were July 6, 1982,
you would enter: **7-6-82**.

(If you are using DOS Version 1.10, the system
responds:

Current time is 00:xx:xx.xx
Enter new time:

Enter the time in the form hh:mm:ss.xx where
hh is the hours, mm is the minutes, ss is the
seconds, and xx is hundredths of a second. (You
can omit the :ss.xx if you wish).

For example, if the time were 10:45, you would
enter: **10:45**.

6.   If you are using **DOS Version 1.10**, you see the
     following message on your screen:

The IBM Personal Computer DOS
Version 1.10 (C)Copyright IBM Corp 1981, 1982

A

Enter the following:

b:update11

7.   If you are using **DOS Version 1.00**, you see the
     following **message** on **your** screen:

The IBM Personal Computer DOS
Version 1.00 (C) Copyright IBM Corp 1981

A

Enter the following:

b:update10

Your DOS programs are now copied onto your Communications Program diskette. When all the DOS programs are copied to the Communications Program diskette, the system responds:

Your program diskette contains the needed DOS programs. While you still have your DOS diskette available, use the DOS DISKCOPY command and make a backup copy of your program diskette. Also, if you intend to use the Download function, you may need to format some blank diskettes which you can do now too with the DOS FORMAT command.

A>

# Loading the Communications Program

To load the Communications Program, do the following:

1.  Insert the Communications Program diskette in the diskette drive (default drive for a dual-drive system).

2.  Turn on the computer; if your computer is already on, hold down the [Ctrl] and [Alt] keys, and at the same time, press the [Del] key.

3. When the screen displays:

```
A>date
Current date is Tue 1-01-1980
Enter new date:
```

Type in the date in the form mm-dd-yy, where: mm is the month, dd is the day, and yy is the last two digits of the year (for example, 81 for 1981).

> **Note:** Your screens may look slightly different from those shown here if you are using DOS Version 1.00.

4. When the screen displays:

```
A>time
Current time is 00:xx:xx.xx
Enter new time:
```

Type in the time in the form hh:mm:ss.xx where hh is the hour, mm is the minutes, ss is the seconds, and xx is hundredths of a second. (You can omit the :ss.xx if you wish.)

5. Now the Communications Program loads and begins initialization.

6. At this point, you see the message:

```
Please wait — program initializing. . .
```

7. You then see the program title followed by the message:

```
Enter screen width (40 or 80) [80]
```

Answer this question by entering either 40 or 80. Just pressing the Enter ($\leftarrow$) key gives a screen width of 80 characters. Use a width of 80 characters, unless the monitor you are using cannot display 80 characters legibly. For example, for a TV screen, enter 40.

STARTING

8. At this point, you see the message:

   After a short pause for further initialization, the
   first of the selection menus is displayed.

9. If you wish to use a separate diskette for saving
   or loading terminal specifications or for
   transferring files, you may now remove the
   Communications Program diskette from the
   drive and insert your new diskette.

# Selecting a Terminal

When you start up the Communications Program,
you are in the terminal selection phase. A series of
menus lets you select which type of terminal the IBM
Personal Computer will simulate and the detailed
features of that terminal.

## Using Menus during Terminal Selection

The terminal selection phase has three levels of
menus. The first-level menu lists the different
terminal types that can be selected. When you select
one of the terminals, a second-level menu lists the
terminal options that can be specified for the
selected terminal. When you select one of the
options, a third-level menu lists the possible choices
for that option.

# Terminal Selection Menu

The Terminal Selection Menu looks like this:

```
Terminal Selection Menu
Choose:

    1  Dow Jones Service or THE SOURCE
    2  VM/370 Terminal
    3  TSO Terminal
    4  User Specified Terminal
    5  Personal Computer Communications
    6  Other Terminal Specification File
    7  Disconnect Communications Line
    8  Exit Program



Type number and press Enter
```
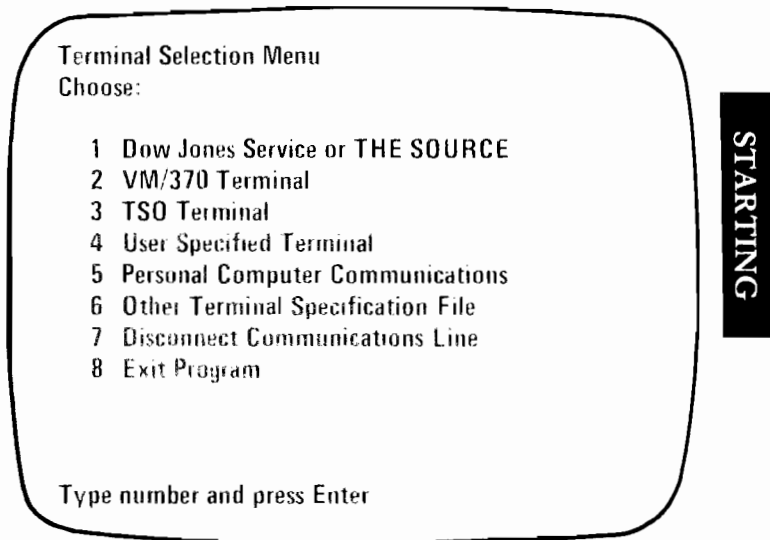
## Dow Jones Service or THE SOURCE

This menu item lets you access two remote systems, the Dow Jones News Service and THE SOURCE. For a discussion of these systems, see Chapter 3, "Using Dow Jones and THE SOURCE."

## VM/370 Terminal

This menu item gives you a terminal that operates with most IBM VM/370 System Control Programs running on an *IBM computer*. For a discussion of VM/370, see Chapter 4, "VM/370 Operation."

## TSO Terminal

This menu item gives you a terminal that operates
with most IBM MVS/TSO System Control Programs
running on an *IBM computer*. For a discussion of TSO,
see Chapter 5, "TSO Operation."

## User Specified Terminal

This menu item lets you specify pertinent
parameters to define your own full duplex terminal.
See Chapter 6, "User Specified Terminal" for more
details.

## Personal Computer Communications

This menu item lets two IBM Personal Computers
with appropriate features talk to each other. See
Chapter 7, "Communicating Between Two IBM
Personal Computers" for more details.

## Other Terminal Specification File

This menu item lets you use a terminal specification
that you have stored in a file. You are asked for the
name of the file where the specification is stored.
The file is accessed, and the parameters of the
specified terminal are loaded. Then a menu lets you
change some of those parameters or start up the
terminal as specified.

## Disconnect Communications Line

This menu item lets you disconnect your terminal
from the communications line.

## Exit Program

This item lets you return to DOS. It does not disconnect you from the communications line. If you want to disconnect, choose **Disconnect Communications Line** first.

# Starting Up as a Terminal

Once you select the parameters of operation for a terminal, you must establish a connection with a host computer system. Then you enter into the terminal operation phase. The following section tells you how to make that connection and how to operate the IBM Personal Computer as a terminal.

**Notes:**

1.  For connecting an IBM Personal Computer to a host system, this manual assumes you are familiar with the operation of that system, and in particular how to specify terminal characteristics on that system, or you are in contact with a host system programmer.

2.  Whether you are a novice to computers or an experienced user, you should carefully read the section "Methods for Connecting to a Host Computer" in Chapter 1.

# Connecting to a Host Computer

To connect to a host computer, perform the following steps for your particular type of modem or direct cable connection. To understand the messages you may receive, see "Establishing Connection" later in this chapter.

1.  If you have a direct cable connection to the computer, make sure the cable is plugged into the Asynchronous Communications Adapter connector at the back of your IBM Personal Computer.

2.  If you are using an acoustic coupled modem or a direct coupled modem, make sure you have connected your system as instructed in Chapter 1, "Using a Modem."

3.  Start up the Communications Program, select the terminal type you will be using, and start up as that terminal. (The different types of terminals are described in the chapters that follow.)

# Connecting an Acoustic Coupled Modem

1.  On your telephone, dial the number of the host computer, and wait until you hear the tone indicating computer access. Then place the telephone handset in the acoustic coupler cups provided on the modem.

    Note: Make sure the mouthpiece and the earpiece go in the correct cups.

2.  If the modem has a READY light, the light should come on and stay on. In addition, the message **Line connected** may appear on the bottom line of your IBM Personal Computer screen.

# Connecting a Direct Coupled Modem Without Autodial

1. On the telephone provided with the modem, dial the number of the host computer, and wait until you hear the tone indicating computer access. You should read the instructions for the modem carefully to understand how to use the telephone set for voice and data transmission.

2. When you hear the tone indicating computer access, switch the telephone set to data transmission mode.

3. The message **Line connected** may appear on the bottom line of your IBM Personal Computer. You are now ready to talk to the host computer.

# Connecting a Direct Coupled Modem With Autodial

1. On your IBM Personal Computer, type the dial-up command required by the modem you are using. Follow the instructions in the modem manual carefully. For some modems, you must enter these commands using uppercase letters only.

   > **Note:** For VM/370 access, you must go into SEND mode (using the [F5] key) before entering a modem command. (See Chapter 4 for more information on VM/370 terminals.)

2. When you have completed the dial-up command, the modem dials the number you have specified, and automatically detects the tone indicating access to the host computer and establishes the connection.

3. The modem indicates that you are ready to talk to the host computer.

# Establishing Connection

The message **Computer connection NOT established** may appear. This message appears if the Data Set Ready or the Clear to Send signal is not present on the communications cable, an indication that the host computer (or the modem) is not ready to talk or communicate with the terminal.

> Note:   If the **Computer connection NOT established** message does not appear, this does not necessarily indicate that the computer connection is established. If, for example, the cable from the modem to the Asynchronous Communications Adapter is not attached, the line controlling the Data Set Ready or the Clear to Send signal could be "floating" and the signals on these lines could read either present or absent. Check occasionally to make sure that the cable connection isn't loose.

The message **You are starting up as a terminal Check computer or modem connection** is given. This message is a warning. If you have not established communications with a remote computer, you should check the connection to that computer or the local modem. See Chapter 10 for troubleshooting details.

## Connection or Logon Retry

If you do not establish connection, press the F2 key. Then select **Return to Terminal Operation**, and try to log on again.

# Operating as a Terminal

Once you have selected your terminal type and connected to your host, you are ready for the terminal operation phase.

The terminal operation phase is discussed for each terminal type in the chapters that follow. But first, let's take a look at some special keys that you will use while your IBM Personal Computer is running as a terminal.

> **Note:** Some host systems (such as VM/370 or MVS/TSO) require special setup procedures. Read the appropriate chapter in this book before you try to access any host system.

## Using Function Keys When Running as a Terminal

The function keys are on the left side of the keyboard.

After you have started up as a terminal, the function keys operate as follows (exceptions are discussed in the individual chapters that follow).
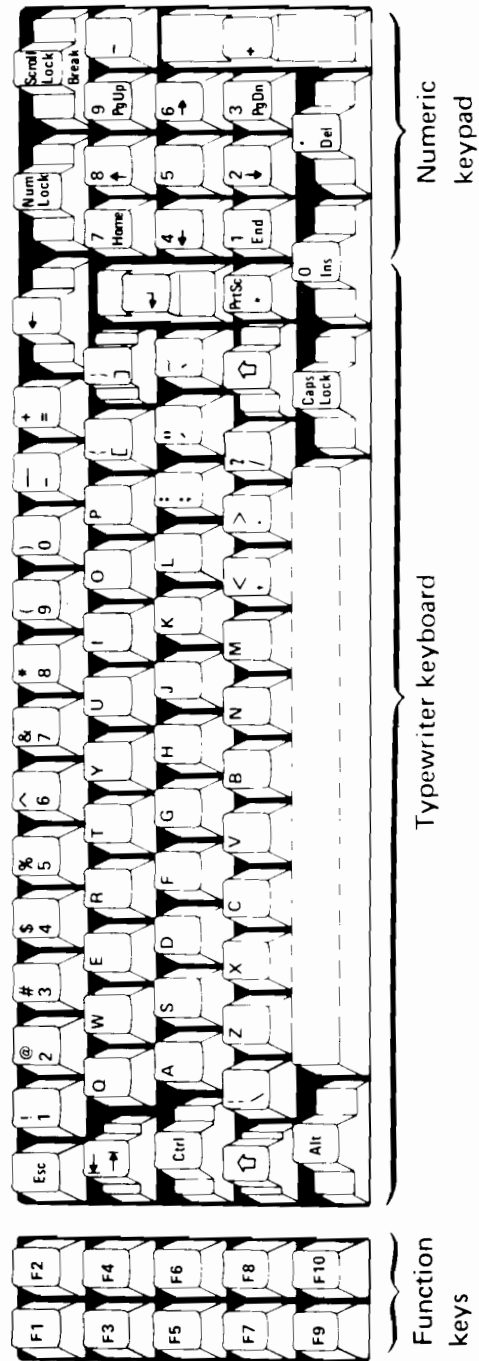
Figure 1. IBM Personal Computer Keyboard

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# F1 – Attention (Break) Sent to Host

Pressing this key produces a BREAK signal on the communications line. This signal is generally used to interrupt processing on the host system. The `F1` key is also used to interrupt file transfer operations (like Upload or Download).

interrupt host operation. does not recognize the BREAK from the `F1` key, use the appropriate key for your system.

# F2 – Access Function Selection Menu

Pressing the `F2` key displays the Function Selection Menu for your type of terminal. (Specific menus are described in the chapters that follow.)

Function Selection Menu
Choose:

    1  Send File Data to Host
    2  Return to Terminal Operation
    3  Return to BASIC
    4  Return to Terminal Selection Menu

Type number and press Enter

Note: You may see additional items on your menu, depending on the type of terminal you select. Refer to the appropriate chapter for information on your particular type of terminal.

From this menu, you can select the type of operation you wish to perform.

For any type of terminal, the last three choices on the Function Selection Menu are:

- **Return to Terminal Operation.** Selecting this item returns you to terminal operation, to where you left off before you pressed the ⌐F2⌐ key to see the Function Selection Menu.

- **Return to BASIC.** Selecting this item returns you to the BASIC command level. It does not disconnect the communications line. See "Returning to BASIC and DOS" later in this chapter for more information.

- **Return to Terminal Selection Menu.** Selecting this item lets you see the Terminal Selection Menu again, from which you can start up as a different type of terminal:

```
Terminal Selection Menu
Choose:

    1  Dow Jones Service or THE SOURCE
    2  VM/370 Terminal
    3  TSO Terminal
    4  User Specified Terminal
    5  Personal Computer Communications
    6  Other Terminal Specification File
    7  Disconnect Communications Line
    8  Exit Program


Type number and press Enter
```

# F3 – Clear (Display Next) Error Message

Error messages are displayed on the bottom line of the screen. If another message is produced while one is being displayed, the second message is kept in a list waiting to be displayed. Pressing [F3] either clears the displayed message or replaces it with the next one in the list.

Two types of messages always replace the current message when they occur:

● Buffer overflow

● Line connected or disconnected

If a message in the list is waiting to be displayed, a blinking asterisk (*) is displayed to the left of the current message. You hear a tone (beep) each time a message is displayed or added to the list. See the section "Dynamic Messages at the Bottom of the Screen" in Chapter 10 for further details.

# F4 – Turn ON/OFF Receive Errors

As described in Chapter 10, under "Turning ON/OFF the Display of Receive Errors," the function to display certain dynamic error messages may be turned either ON or OFF. If this function is OFF, pressing the [F4] key turns it ON. If this function is ON, pressing the [F4] key turns it OFF.

At system startup, this function is OFF (messages are not displayed). You can see the current status of this function by pressing the [F10] key.

By turning this function ON (pressing $\boxed{\text{F4}}$), you see the following types of messages:

- Parity

- Overrun

- Framing

- Break from host

Refer to Chapter 10 for details on these types of messages.

## F5 – Unused except for VM/370

## F6 – Turn ON/OFF Hex Listing

Pressing $\boxed{\text{F6}}$ turns ON the Hex Listing function. When Hex Listing is ON, all graphic characters that you receive from the host are displayed normally, but all control characters are displayed (in brackets) as their hexadecimal equivalents. For example, a Carriage Return is displayed as <0D>. The normal functions of the control characters are also inhibited, so a received Carriage Return does not cause the screen to space to a new line. While Hex Listing is ON, File Writing (see F8 below) is inhibited, and no data from the host is stored on the file.

To turn OFF Hex Listing, press $\boxed{\text{F6}}$ again.

Depending upon which terminal specification you are using, some control characters may be deleted by the Communications Program and not appear in a Hex Listing. "How to Use the Hex Listing" in Chapter 10 discusses the use of Hex Listing in more detail.

> Note: The Communications Program takes significantly longer to process a line when Hex Listing is turned ON. Therefore, buffer overflow may occur when you use this mode for bit rates of greater than 300 bits per second (bps).

## F7 – Turn ON/OFF Printer Function

For an IBM Personal Computer with an attached parallel printer, all (or portions) of a terminal session can be printed. To start printing, press the [F7] key. If the printer is ready, the session date and time are printed and the word **PRINT** is highlighted at the bottom of the screen. From then on, all of the terminal session activity displayed on the screen will then be printed on the printer.

To turn OFF terminal session printing, press [F7] again. The word **PRINT** is no longer highlighted on the screen.

Terminal session printing keeps up with the input of data from a host computer at 300 bps. At 600 bps or higher, the printer falls behind the input of data from the computer. If short pieces of data are transmitted, no problems occur. However, if the receive buffer gets close to overflow, the print function is automatically turned OFF.

In addition, if the printer is no longer ready for any reason (for example, running out of paper), then the print function is also turned OFF.

## F8 – Turn ON/OFF File Writing

Pressing this key turns ON (or OFF) the file writing function.

If you want to save in a file a copy of everything that is received from the host system and displayed on the screen, press the [F8] key. Your computer then asks you to enter the name of the file in which you want the information to be saved. (Refer to your IBM Personal Computer *Disk Operating System (DOS)* manual for information on filenames.)

The file you specify is created, or if the file you specify already exists, you are given three choices:

**Exit**      Leave the existing file as it is

**Overwrite**  Write over the existing file with the new information

**Append**    Add the new information to the end of the existing file

The Communications Program then begins to copy everything received from the host into your file. It continues until you stop it by pressing the [F8] key again. Then the file is closed, and the word **FILEWRITE** is no longer highlighted on the screen.

## F9 – Unused

## F10 – HELP Menu

Pressing the [F10] key displays the following HELP Menu, which shows you the use of the function keys. In addition, the status (either ON or OFF) is displayed following the description of the [F4], [F6], [F7], and [F8] keys.

When operating as a terminal—
use function keys as follows:

F1  Attention (Break) sent to host
F2  Access Function Selection Menu
F3  Clear (Display next) error message
F4  Turn ON/OFF receive errors [OFF]
F5  Switch to SEND state (VM/370 only)
F6  Turn ON/OFF hex listing [OFF]
F7  Turn ON/OFF printer function [OFF]
F8  Turn ON/OFF file writing [OFF]
F9  Unused          F10  This HELP Menu
[ON or OFF] indicates current status.

The menu shown on this page is the menu shown on a 40 character screen. If you have an 80 character screen, the same information appears, but it is in a different order on the screen.

# Disconnect Communications Line

If you select this menu item, the Communications Program tries to disconnect the current communications line. A signal to perform the disconnect is sent, and control lines are tested to determine if the disconnect was successful. If no terminal has been started up, no disconnect is attempted, and the message **Terminal connection never established** appears on the bottom line of the screen.

If you have been running as a terminal, the disconnect is attempted, and the control lines are tested to see if the communications line is disconnected. If a disconnect has occurred, the message **Disconnect successful** appears on the bottom line of the screen. If no disconnect has occurred, the message **Disconnect failed** appears on the bottom line of the screen.

# Why Disconnect Fails

Some modems ignore the control lines on which the disconnect signal is sent by your IBM Personal Computer. These modems continue to hold the connection and keep signals on the control lines indicating that fact. In particular, modems with autodial may be set in this fashion so that you can communicate with the modem even when a telephone connection has not been established. This type of setup is necessary so that you can send commands (such as those for dialing) to the modem.

If you are connected through a modem that does not disconnect when requested, you must disconnect the telephone connection in some other fashion. For an acoustic coupler, you can remove the telephone handset from the modem and hang up the phone. For a modem with autodial, you may have a command that you can send to the modem to hang up the phone.

If you want more details about the signals that are controlled and tested by the disconnect communications command, see Chapter 10.

# Returning to BASIC and DOS

## How the Communications Program is Loaded

If you are going to be returning to the Communications Program from BASIC (or DOS) other than by using the CONT command, you should understand how the Communications Program is loaded and started up. When you start up your IBM Personal Computer with the Communications Program diskette, the batch file AUTOEXEC.BAT is executed. This file performs the following functions.

It asks you for the date and time.

It loads the Base Program (RS232INT.EXE). Once loaded, the Base Program stays permanently in memory until you do a System Reset (or power off and power on) of your IBM Personal Computer.

It loads BASIC, and loads and starts the Communications Program with the command **BASIC TERMINAL/C:0/F:2.**

When TERMINAL (the Communications Program) is started, it immediately loads (chains) the BASIC program TERMINIT from the default drive. The TERMINIT code is executed (to perform program initialization), and then the TERMINIT code is deleted.

# Returning to BASIC

During operation as a terminal, you can return to BASIC command level by selecting the **Return to BASIC** menu item on the Function Selection Menu. For example, to get a listing of the files on your default diskette, you could return to BASIC and enter the command **FILES**.

# Running other BASIC Programs

After you have returned to BASIC command level, you can run other BASIC programs.

However, because the Base Program has been loaded and is occupying memory space, there will be less space available for BASIC execution in an IBM Personal Computer with 64K of memory. In addition, programs that use the BASIC communications facility or more than two files simultaneously will not operate due to the fact that BASIC has been loaded with the /C:0/F:2 options. If you have problems running a BASIC program, perform a System Reset and try running the program again.

If you have run a BASIC program without returning to DOS or doing a System Reset, you can restart the Communications Program with the command **RUN "TERMINAL"**, with the Communications Program diskette in the default drive. In this case, when you restart as a terminal, your IBM Personal Computer will not have disconnected you from the host system during the time you were in BASIC or running another program.

If you return to DOS, restart the Communications Program as described in "Returning to DOS."

## Returning from BASIC to Terminal Operation

The BASIC CONT command returns you to terminal operation.

> Note: The CONT command can be executed only if you have not modified any statements in the BASIC program.

# Returning to DOS

You can return to DOS by using the **Exit Program** item in the Terminal Selection Menu. You can also use the SYSTEM command to return to DOS from the BASIC command level. In either case, if you attempt to run a program under DOS that requires most of the memory in your IBM Personal Computer, the program may not execute as the Base Program still occupies memory space. If a program fails to run, perform a System Reset and try running the program again.

To restart the Communications Program from DOS, enter the command **AUTOEXEC**, with the Communications Program diskette on the default drive. If you have performed a System Reset since last using the Communications Program, your IBM Personal Computer will have disconnected the host system. If you have not done a System Reset, the IBM Personal Computer will not have disconnected the host computer unless you ran a program that disconnects communications.

# CHAPTER 3. USING DOW JONES AND THE SOURCE

## Contents

**DOW/SOURCE**

# What Are Dow Jones and
# THE SOURCE?

The first choice on the Terminal Selection Menu is
**Dow Jones** or **THE SOURCE.** These are two data
bases that you can access with your IBM Personal
Computer and the Communications Program. You
can think of a *data base* as a collection of information.

Both the Dow Jones Service and THE SOURCE are
services that you subscribe to, and pay for, separately
from the cost of your Communications Program.

Other services may be available in your area. See
your authorized IBM Personal Computer dealer for
more information. If using another service, refer to
Chapter 6, "User Specified Terminal."

The Dow Jones Service contains Dow Jones stock
exchange information and news. Once you are
connected to the Dow Jones Service, you can
retrieve information and display the information on
your screen or optionally print it out with an
attached printer.

THE SOURCE is a combination of data bases. Once
you are connected to THE SOURCE, you can
choose from a wide range of information and
services.

DOW/SOURCE

# How Do You Access Them?

To access the Dow Jones Service or THE SOURCE, make sure you are connected as described in "Methods for Connecting to a Host Computer" in Chapter 1. Then turn on your IBM Personal Computer and load the Communications Program. (See "Loading the Communications Program" in Chapter 2 for instructions.)

Your screen should look like this:

```
Terminal Selection Menu
Choose:

   1  Dow Jones Service or THE SOURCE
   2  VM/370 Terminal
   3  TSO Terminal
   4  User Specified Terminal
   5  Personal Computer Communications
   6  Other Terminal Specification File
   7  Disconnect Communications Line
   8  Exit Program



Type number and press Enter
```
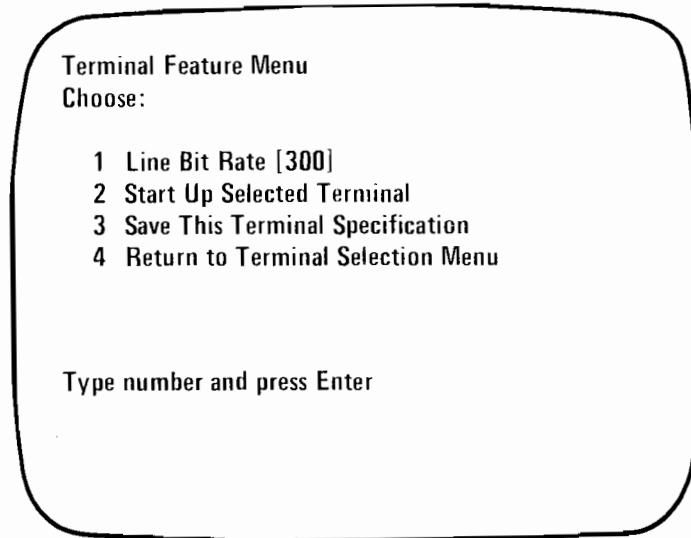
Now perform the following steps:

1.  Type the number 1 and press the Enter ($\longleftrightarrow$)
    key.

    The following menu appears on the screen:

```
Terminal Feature Menu
Choose:

    1   Line Bit Rate [300]
    2   Start Up Selected Terminal
    3   Save This Terminal Specification
    4   Return to Terminal Selection Menu



Type number and press Enter
```

This is the Terminal Feature Menu. From this
menu, you can change the line bit rate, start up
your terminal, save your terminal specification
in a file, or return to the Terminal Selection
Menu.

Since we are only starting our session, we will
use only Options 1 and 2 at this time. We will
discuss Options 3 and 4 later in this chapter.

> Note: The line bit rate is the only
> pertinent terminal parameter that you can
> change from this menu. For information
> on how to change other parameters, see
> "Other Terminal Specification File" later
> in this chapter.

2.   The number in brackets [300] is the *default*,
     which you get when you start up. This default
     value is selected because most terminals
     communicate with the Dow Jones Service or
     THE SOURCE with this line bit rate. You
     probably do not need to change it.

     The default line bit rate (sometimes called baud
     rate) is 300 bits per second (bps). To use this
     rate, you should use a modem that operates at
     300 bps and dial a telephone number that
     provides a connection at that rate.

     Dow Jones Service and THE SOURCE can also
     use a line bit rate of 1200 bps. To use that bit
     rate, you need a modem and a telephone
     number that provide a 1200 bps connection. If
     you need to specify 1200 bps, enter the number
     1 on the Terminal Feature Menu. The following
     menu is displayed:

```
Line Bit Rate (Bits/Sec)
Choose:

        1  75
        2  110
        3  150
     ** 4  300
        5  600
        6  1200
        7  1800
        8  2400
        9  4800
       10  9600
     ** Indicates current default


Type number and press Enter
```

The ** next to the 300 indicates that the
terminal will start up with a communications
line speed of 300 bits per second (bps), unless
you change it.

3-6

Type the number for the line speed you are using. For example, if you are connecting to a 1200 bps computer port, type the number 6 and press the Enter ($\leftarrow$) key. This sets the line bit rate to 1200 bps. The Terminal Feature Menu appears on the screen again.

> Note: If you are accessing THE SOURCE
> at 1200 bps and plan to print long listings
> "Printing Data from THE SOURCE at
> 1200 Bps" at the end of this chapter.

3. Type the number 2 and press the Enter ($\leftarrow$) key.

   This tells your IBM Personal Computer that you are ready to start up as a terminal.

4. You see the following message on your screen:



    You are starting up as a terminal
    Check computer or modem connection
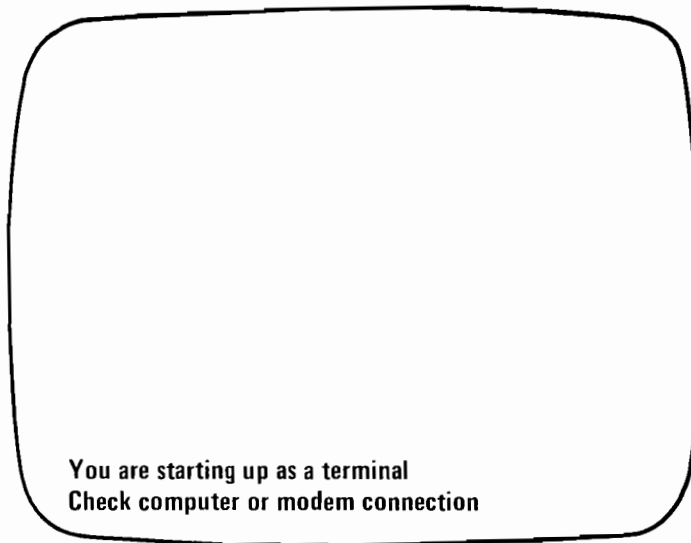
The following message may or may not also appear on your screen:

Computer connection NOT established

5.  Now you make your phone connection. Follow the instructions in Chapter 2 under "Connecting to a Host Computer."

    > **Note:** If you have turned on the display of receive errors by pressing the $\boxed{\text{F4}}$ key, you may want to turn it off now, because you may see several parity errors as you log on.

6.  After the connection is made, you see:

    please type your terminal identifier

    You also see **Line connected** at the bottom of your screen. This message tells you that you are connected to the network that you dialed; it does not indicate success or failure of logon.

7.  You must type your terminal identifier (as supplied with your subscription) and then press the Enter ($\boxed{\leftarrow\!\!\rule{0.4em}{0pt}}$) key.

    The Dow Jones Service may or may not accept use of the Backspace ($\boxed{\leftarrow}$) key. If you make an error, you may need to retype your entry.

8.  Then you see:

    please log in

9.  Follow the logon procedure you received with your Dow Jones or SOURCE instructions.

    > **Note:** When you enter the password, you may not see anything on the screen, and the cursor may not move as you type the characters.

10. You are now ready to start accessing the Dow Jones or SOURCE data base. For more directions, refer to the instruction booklet you received with your subscription.

# Other Terminal Specification File

On the Terminal Feature Menu, you can change only one terminal parameter: the line bit rate. Occasionally, you may need to change other parameters.

If you need to change some other parameters, when you get the Terminal Selection Menu on program startup, enter 6 to request **Other Terminal Specification File**.

The Communications Program asks you to enter the name of the file where the specification is stored. Enter the name **DOWMOD**. (If you have stored your specifications in another file, see "Saving a Terminal Specification" later in this chapter.)

DOWMOD is a file on the Communications Program diskette that contains the default parameters for the Dow Jones Service or THE SOURCE.

> Note: The actual filename on the diskette is DOWMOD.TER, but do not enter the .TER. The Communications Program adds .TER to the filename you enter.

DOWMOD.TER is loaded, and you see the following Terminal Feature Menu, which shows all of the default values in brackets [ ]:

```
Terminal Feature Menu
Choose:

    1  Line Bit Rate [300]
    2  Type of Parity Checking [Even]
    3  Number of Stop Bits [One Bit]
    4  XON/XOFF Support [Absent]
    5  Local or Host Character Echoing [Host]
    6  First Character to be Deleted [LF]
    7  Second Character to be Deleted [XOFF]
    8  Third Character to be Deleted [XON]
    9  Fourth Character to be Deleted [All]
   10  Line End Character Sent by Host [CR]
   11  Communications Adapter Address [1]
   12  Start Up Selected Terminal
   13  Save This Terminal Specification
   14  Return to Terminal Selection Menu


Type number and press Enter
```

You can change any of the parameters on this screen, or you can start up the terminal as specified. For example, the default type of parity checking is **Even**. If you wish to specify another type of parity checking, enter **2**. Then enter the type you want when the next screen appears.

Refer to Chapter 6 for a complete description of the different parameters.

# Saving a Terminal Specification

After you have made all of your changes on the Terminal Feature Menu, you can save your new specifications in a file. To do so, enter **13** for **Save This Terminal Specification.**

The Communications Program asks you to enter the name of the file where you wish to save the specification. Enter any valid filename *except* DOWMOD.

If the filename you enter already exists, you are asked if you wish to overwrite the file or exit. If you choose to exit, you can try to save the file again with a different name.

From now on, whenever you want to use the specification you have saved, you enter *your* filename for the Other Terminal Specification File.

For example, on the Terminal Selection Menu, enter 6 for **Other Terminal Specification File.** Then when you are asked to enter the name of the file, enter the name you have saved your specification file in.

# Return to Terminal Selection Menu

If you wish to return to the Terminal Selection Menu (if you entered the wrong terminal type or want to run as another type of terminal), enter 4 on the Terminal Feature Menu.

# Use of Special Keys for the Dow Jones Service and THE SOURCE

Before we go on to the logoff procedure, let's look at the Enter ([←]) key, which has a special meaning when operating as a terminal with the Dow Jones Service or THE SOURCE.
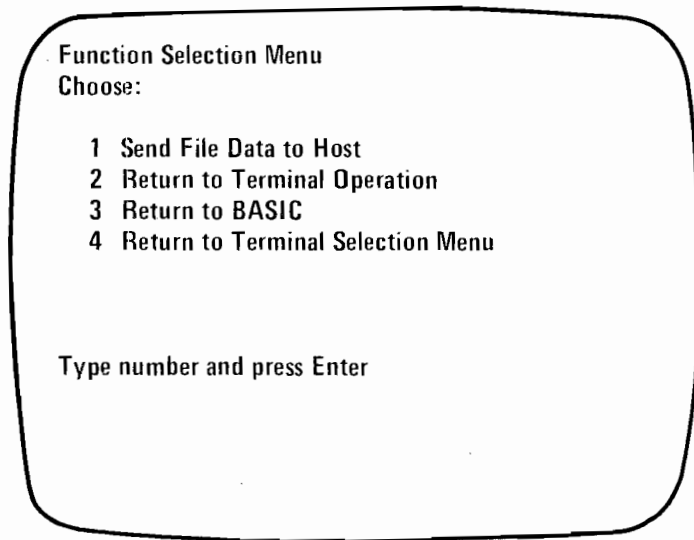
## The Enter Key

You must press the Enter ( [←] ) key whenever the message on the screen tells you to *enter* or *type* something. That is, you type the required entry and then press the Enter ([←]) key.

3-11

You also press the Enter ((⏎)) key while running on either the Dow Jones Service or THE SOURCE to continue operation. For example, if the instructions on the screen say **MORE**, press the Enter ((⏎)) key to see the next screen. If the instructions say **END**, press the Enter ((⏎)) key to stop the current function and display the menu again.

Note: The Dow Jones Service and THE SOURCE may sometimes refer to the **Return** key. If you see a reference to the Return key, use the Enter ((⏎)) key.

# Using the Function Selection Menu

While operating as a terminal connected to the Dow Jones Service or THE SOURCE, press the (F2) key. The following Function Selection Menu is displayed:

```
Function Selection Menu
Choose:

    1  Send File Data to Host
    2  Return to Terminal Operation
    3  Return to BASIC
    4  Return to Terminal Selection Menu


Type number and press Enter
```

The last three menu items were described in Chapter 2.

You use item 1, **Send File Data to Host**, when you wish to send information to THE SOURCE. You can send a copy of a file instead of entering the information online when you want to send types of information such as the following:

- A program

- A bulletin board notice

For more information on how to send information to THE SOURCE, refer to Chapter 8.

> Note: When sending a file to THE SOURCE, specify that you wish to wait for the return character from the host after each line sent. Then specify a return character of Hex code 0D.

# Printing Data from THE SOURCE at 1200 Bps

When you list certain information available on THE SOURCE on your IBM Personal Computer screen, you can set THE SOURCE so that it transmits this information continuously and does not stop when it has displayed a full page on your screen. If you are printing the information as you receive it and are connected over a 1200 bps line, THE SOURCE can transmit data to your IBM Personal Computer so fast that the receive buffer overflows.

To avoid this overflow, turn on the XON/XOFF control. To do this, select item 6 on the Terminal Selection Menu, and then specify the filename DOWMOD. On the Terminal Feature Menu, enter 4 for **XON/XOFF Support**. On the next menu, select **XON/XOFF Control Supported**. You may then wish to save this terminal specification for later use as previously described in "Saving a Terminal Specification." For more information on XON/XOFF control, see Chapter 6.

# How to Log Off

Log off procedures are provided in your Dow Jones or SOURCE instruction booklet. Please refer to those instructions when you are ready to log off.

# CHAPTER 4. VM/370 OPERATION

## Contents

VM/370

# What Is VM/370?

The second choice on the Terminal Selection Menu is VM/370 **Terminal**. VM/370 is a system control program that operates on an IBM computer equipped with appropriate interface hardware.

The Asynchronous Communications Support Program allows you to communicate with most VM/370 system control programs that operate on an IBM computer. However, some installations may have a modified version of VM/370, with which the Communications Program will not work. See Appendix D, "Protocols," for specific protocol information.

Access to this system can be either by local cable connection or over remote telephone lines.
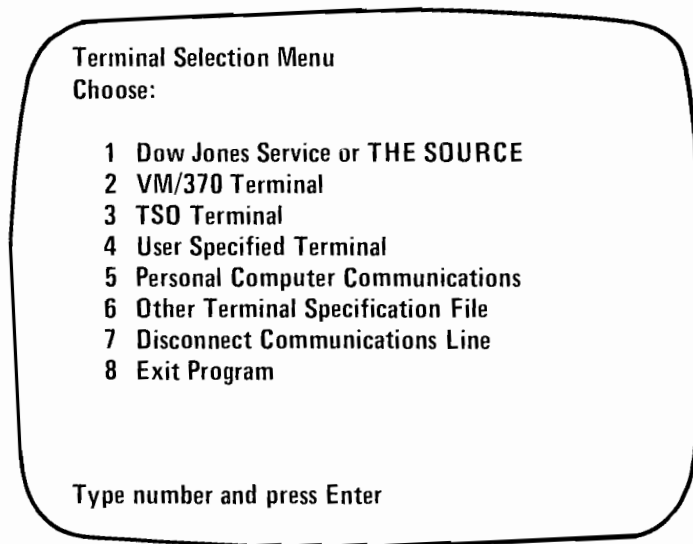
Once you are connected and operating as a VM/370 terminal, we assume that you are familiar with VM/370 operations. If you have questions on particular VM/370 operations, refer to the instruction manuals you received with that system, or contact your system programmer.

# How Do You Access It?

If you are unfamiliar with the Communications Program, we suggest that you read through all of this chapter before you try to operate as a VM/370 terminal. You will want to determine your terminal features before you begin to specify them in the program.

To access VM/370 and operate as a VM/370
terminal, make sure you are connected as described
in "Methods for Connecting to a Host Computer" in
Chapter 1. Then turn on your IBM Personal
Computer and load the Communications Program.
(See "Loading the Communications Program" in
Chapter 2 for instructions.)

After the program loads, your screen looks like this:

```
Terminal Selection Menu
Choose:

    1  Dow Jones Service or THE SOURCE
    2  VM/370 Terminal
    3  TSO Terminal
    4  User Specified Terminal
    5  Personal Computer Communications
    6  Other Terminal Specification File
    7  Disconnect Communications Line
    8  Exit Program


Type number and press Enter
```

Now perform the following steps:

1.   Type the number 2 and press the Enter ($\longleftarrow$)
     key.

The following menu appears on the screen:

```
Terminal Feature Menu
Choose:

    1  Line Bit Rate [300]
    2  Type of Parity Checking [Mark]
    3  Line Turnaround Char Sent to Host [CRWD]
    4  Start Up Selected Terminal
    5  Save This Terminal Specification
    6  Return to Terminal Selection Menu



Type number and press Enter
```

This is the Terminal Feature Menu. Using this menu, you can change the line bit rate, the type of parity checking, and the line turnaround character sent to the host, start up your terminal, save your terminal specification in a file, or return to the Terminal Selection Menu.

The items in brackets on the menu are the *defaults*, which you get when you start up. These default values are selected because most VM/370 systems run with these values. You probably do not need to change them.

2.   The line bit rate represents the rate at which characters are sent across the communications line. The default line bit rate is 300 bits per second (bps). If you do not wish to change your line bit rate, go on to Step 3.

If you are using another line bit rate for your computer, for example, 1200 bps, type the number 1 and press the Enter ($\leftarrow$) key. You see the following menu:

```
Line Bit Rate (Bits/Sec)
Choose:

    1  75
    2  110
    3  150
**  4  300
    5  600
    6  1200
    7  1800
    8  2400
    9  4800
   10  9600
**  Indicates current default


Type number and press Enter
```

The ** next to the 300 indicates that the VM/370 terminal will start up with a communications line speed of 300 bits per second (bps), often called 300 baud, unless you change it. This is known as the *default* value.

Type the number for the line speed you are using. For example, if you are connecting to a 1200 bps computer port, type the number 6 and press the Enter ($\leftarrow$) key. This sets the line bit rate to 1200 bps. The Terminal Feature Menu appears on the screen again.

3. Parity checking uses a binary digit added to each character to check what is sent between your IBM Personal Computer and the host. The default value on the menu for the type of parity checking to be performed on the characters sent between your IBM Personal Computer and VM/370 is **mark**. If your system is not communicating with mark parity, type the number 2 and press the Enter (⏎) key.

The following menu is displayed:

```
Type of Parity Check
Choose:

       1 None
       2 Odd
       3 Even
 **    4 Mark
       5 Space
 **    Indicates current default



Type number and press Enter
```

Type the number of the type of parity checking your host system uses, and then press the Enter (⏎) key. Pressing Enter (⏎) returns you to the Terminal Feature Menu. For more details on parity checking, see "Type of Parity Checking" in Chapter 6.

4. You can specify one other parameter on the Terminal Feature Menu for a VM/370 terminal, the line turnaround character sent to host. For information on how to change other parameters, see "Other Terminal Specification File" later in this chapter.

The default character for the line turnaround character sent to host is *CRWD*, which stands for *Carriage Return Without a new Display line*.

If you select this option, when you press the Enter ([↵]) key at the end of an input line, the program waits for a response from VM/370 before moving the cursor to the next line. Operating in this way eliminates blank lines on the screen and lets you see more of your terminal session.

If you wish to have the cursor move to the next line on input, enter number 3 on the Terminal Feature Menu. You see the following menu:

```
Line Turnaround Char Sent to Host
Choose:

       1  Carriage Return (HEX 0D)
       2  XON (HEX 11)
       3  XOFF (HEX 13)
       4  EOT - End of Transmission (HEX 04)
       5  Line Feed (HEX 0A)
   **  6  CR Without New Display Line
   **  Indicates current default



   Type number and press Enter
```

To have the cursor move to the next line on input, enter the number 1. Pressing the Enter (($\leftarrow$)) key returns you to the Terminal Feature Menu.

5.   Type the number 4 on the Terminal Feature Menu and press the Enter (($\leftarrow$)) key.

This tells your IBM Personal Computer that you are ready to start up as a terminal.

6.   You see the following message on your screen:

```
Computer connection NOT established
You are starting up as a terminal
Check computer or modem connection
Starting in RECEIVE state
Use F5 (or F1 after VM/370 connect) to go to SEND state
```

Note:   The first line of this message may not appear on your screen.

7.   The word **RECEIVING** or the letters **RC** should also be displayed in the lower right-hand corner of the screen. **RECEIVING** (or **RC**) indicates that the program is ready to display any data received from VM/370.

8. Now you make your phone connection. Follow the instructions in Chapter 2 under "Connecting to a Host Computer."

> Note: If you are using a modem with autodial, you must go to SEND state first by pressing the F5 key.

9. After the connection is made, you may see the following message:

**VM/370 ONLINE**

This message indicates that VM/370 is ready to talk to you.

> Note: If, instead of this message, you see a string of meaningless characters, you probably are using the wrong line speed.

10. Now press the F1 (Communications Attention) key to signal to VM/370 that you are ready to log on.

The message **Attention (Break) sent** will appear, indicating that the attention signal was sent to VM/370.

11. You see the following message:

**Attention (Break) sent**
**!**

●

This period indicates VM/370 is ready for your terminal input. The message **SENDING** (or the letters **SN**) in the lower right-hand corner of the screen also indicates you may type input on the keyboard.

Note: If this period and the **SENDING** message fail to appear when VM/370 has completed output, check your VM profile for AUTOREAD OFF in CP (the Control Program of VM/370). In this case, Communications Attention (BREAK) signals are required after every output from VM/370. That is, you must press the ⌈F1⌉ key after each line is received from VM/370. Then, after you logon, enter the following command to restore the display of the period:

**SET AUTOREAD ON**

12. Follow your usual VM/370 procedure for logging on and starting CMS.

    When you see the message indicating that CMS is loaded, press the Enter (⌈⏎⌉) key to complete CMS startup.

After the remainder of the logon messages are displayed, you see a period followed by the cursor. The period is the prompt where you enter commands to VM/370.

You are ready to use VM/370, which now operates as it would from any ASCII terminal.

VM/370

# Special Terminal Features

## Using the Backspace Key

You probably want to be able to use the Backspace key on your keyboard for correcting errors.

When you press the Backspace (⬅) key (on the right top-row of the keyboard), the cursor on the screen moves back one space. A backspace character (Hex 08) is transmitted to the VM/370 system.

By setting the Character Delete character in VM/370 equal to the backspace character, you can backspace over characters on an input line and delete the corresponding characters that were sent to VM/370. To set the Character Delete character in VM/370, type the following:

**TERMINAL CHARDEL**

Then press the following keys in order:

1.   Space bar ⬜

2.   Backspace key (⬅)

3.   Enter key (⮐)

## Setting the Linesize

When operating the IBM Personal Computer as a VM/370 terminal, the Communications Program handles any length line (up to 255 characters) received from the host system. Therefore, set the terminal linesize in VM/370 to the maximum of 255 characters. To do so, enter the following CP command:

**TERMINAL LINESIZE 255**

You may also wish to include this TERMINAL command in your PROFILE EXEC.

> Note: If you disconnect from VM/370 and then log back onto VM/370, you must reset the LINESIZE.

# Changing Your PROFILE EXEC

If you plan to use your IBM Personal Computer as a VM/370 terminal often, you can set the Character Delete character and linesize by including a TERMINAL command as a line in your PROFILE EXEC. (Your PROFILE EXEC is executed automatically each time you log onto VM/370 and IPL CMS. CMS stands for Conversational Monitor System.)

You can set the linesize and the Backspace ($\boxed{\leftarrow}$) key in one statement in your PROFILE EXEC by adding the following line:

### CP TERMINAL LINESIZE 255 CHARDEL ←

However, you may have trouble entering this line, because the editor you are using may not properly recognize the backspace ( $\boxed{\leftarrow}$ ) as a valid character. You can avoid this problem by entering another character and altering it as follows:

Using an editor available under CMS (for example, XEDIT), enter the following line in your PROFILE EXEC:

### CP TERMINAL LINESIZE 255 CHARDEL X

Then in edit mode, enter the command:

### Alter X 16

The 16 is used because it is the VM/370 EBCDIC hex code for the backspace character.

Then save the PROFILE EXEC on VM/370.

# Use of Special Keys for VM/370

Before we go on to other VM/370 functions and the logoff procedure, let's look at some special keys.

## Function Keys

Two function keys have special meanings when you are using VM/370:

**Key Use**

F1   Press this key to produce a BREAK signal on the communications line. This signal is generally used when VM/370 is producing output and you wish to stop that output.

F5   Press this key to switch to SENDING state when you see the RECEIVING message at the bottom of your screen. You normally do not need to use this key during VM/370 operation.

## The Enter key
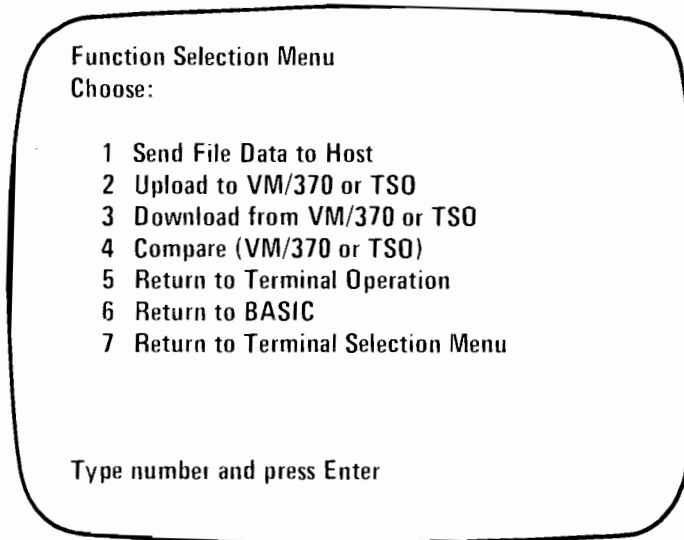
You must press the Enter (⏎) key whenever the message on the screen tells you to *enter* or *type* something. That is, you type the required entry and then press the Enter (⏎) key.

You also press the Enter (⏎) key while logging onto VM/370 an waiting for the logon to continue.

The Enter (⏎) key is also used to tell VM/370 that you have completed a line of input.

# Using the Function Selection Menu

With your IBM Personal Computer in the SENDING state, press the ⌈F2⌉ key. The following Function Selection Menu is displayed:

```
Function Selection Menu
Choose:

    1  Send File Data to Host
    2  Upload to VM/370 or TSO
    3  Download from VM/370 or TSO
    4  Compare (VM/370 or TSO)
    5  Return to Terminal Operation
    6  Return to BASIC
    7  Return to Terminal Selection Menu


Type number and press Enter
```

The last three menu items were described in Chapter 2.

The other items on this menu perform the following functions:

1.  **Send File Data to Host** lets you send a copy of a file on your IBM Personal Computer to VM/370. For information and instructions, refer to Chapter 8, "General File Transfers."

    In general, use the Upload facility to transfer files to VM/370 (option 2). In some rare cases, option 2 does not work, and then you should use option 1.

2. **Upload to VM/370 or TSO** transfers a file from the IBM Personal Computer to a VM/370 host system. (See "Uploading a File" in this chapter.)

3. **Download from VM/370 or TSO** transfers a file from a VM/370 to the IBM Personal Computer. (See "Downloading a File" in this chapter.)

4. **Compare (VM/370 or TSO)** compares a file on VM/370 with a file on the IBM Personal Computer.

# Transferring Files With VM/370

The Upload, Download, and Compare functions invoke the CMS Editor. Thus, the CMS Editor must be available on the VM/370 system being accessed and should be invoked when the EDIT command is given in CMS. Specifically, if the VM/370 SP is invoked, the command EDIT may invoke the XEDIT editor (through a system EXEC). The XEDIT editor cannot be used for uploading or downloading because the Communications Program does not recognize its responses. The command SET IMPEX OFF can force the EDIT command to invoke the CMS Editor. The VM/370 EDIT EXEC can also be used.

# VM/370 EDIT EXEC

To make sure that the correct CMS Editor is invoked, and to correctly set a number of VM/370 parameters, create and save the VM/370 EXEC shown below. Assign the name EDIT EXEC to this EXEC. Refer to the *VM/370 CMS Commands and MACROS* manual for information on creating and using EXECs.

```
&CONTROL OFF
CP TERMINAL ESCAPE OFF LINEND OFF LINEDEL OFF
CP SET MSG OFF WNG OFF
SET BLIP OFF
CP TERMINAL LINESIZE 255
EDIT &1 &2 &3 &4 &5 &6 &7
CP TERMINAL ESCAPE ON LINEND ON LINEDEL ON
CP SET MSG ON WNG ON
SET BLIP ON
```

When a file transfer operation (for example, Upload) invokes the CMS Editor, it calls up this EXEC. The correct CP and CMS operational parameters are then set and the CMS Editor is invoked.

The lines in this EXEC perform the following functions:

&CONTROL OFF turns OFF the printing of the lines of the EXEC as it is run.

CP TERMINAL ESCAPE OFF LINEND OFF LINEDEL OFF sets the system so that no characters indicate special functions to VM/370.

For example, on many VM/370 systems, a # character indicates the end of a logical line. Setting LINEND OFF ensures that # characters on a file are correctly uploaded to VM/370.

**CP SET MSG OFF WNG OFF** turns OFF messages so that they are not displayed on the screen. This prevents a message that is being sent to you from becoming embedded in a file that you are downloading.

**SET BLIP OFF** turns OFF the blip character that could otherwise appear in the middle of a file being downloaded.

**CP TERMINAL LINESIZE 255** sets the linesize so that VM/370 does not break lines being downloaded into two or more shorter lines.

**EDIT &1 &2 &3 &4 &5 &6 &7** causes the system to use the EDIT MODULE for editing, rather than an EDIT EXEC.

The last three statements in the EXEC restore the VM/370 control to the default values for your system.

> Note:   If you normally run with any of the parameters set to values different from the system defaults, change these last three statements so that the parameters are restored to your own values. For example, if you have defined a Line Delete character to be other than the cents sign (which is not available on the ASCII keyboard), you should change **LINEDEL ON** in the first of these statements to **LINEDEL** *char*, where *char* is your Line Delete character.

After you enter this EDIT EXEC, be sure to save it, and return to CMS before you try to upload or download a file.

# Rules of Operation For Upload, Download, and Compare

The following rules apply to file transfers with VM/370.

## General

- Only files that can be displayed as text on your terminal (with the TYPE command in DOS, for example) can be uploaded and downloaded. See Chapter 9, "Conversion of ASCII and Binary Files" for instructions on using FILECONV to convert non-ASCII files.

- You can specify filenames using either uppercase or lowercase letters.

- In the discussion that follows, we refer to *lines* in a file. A file line is a string of characters written on a file with an end-of-line delimiter at the end. It is essentially the same as a file *record*, if you are familiar with that term.

  IMPORTANT: If a null file line is detected in uploading, downloading, or comparing, it is always converted to a line containing a single blank. This conversion is necessary to properly upload such lines (a null line signals the end of uploading to the host computer). This conversion has no serious effect on operations except in the rare case where null lines are used to signal specific operations.

VM/370

# Upload

- To upload a BASIC file, you must store it on the diskette with the A(ASCII) option of the SAVE command (for example, SAVE "filename",A). Text may be in either uppercase or lowercase.

- Uploaded files are always placed on variable length files.

    Note: The maximum length line you can upload is 130 characters. Uploading stops if a line longer than 130 characters is encountered.

- Because a single line in a host computer file may contain multiple Carriage Return characters, and because a Carriage Return character always terminates a file line on the IBM Personal Computer, uploading a file back to the host computer may produce a file that is not identical to the original host computer file. However, the content of the files (from the point of view of, say, printing or comparing them) is the same.

- If Upload abnormally ends prior to saving on VM/370, you have an option of returning to the CMS Editor. At that point, any action possible in the Editor may be taken. For example, if the uploaded file was not saved due to lack of space, you can ERASE old files to make space and then save the file with a FILE command.

If you are using the VM/370 EDIT EXEC described above, you do not need to perform the next two steps.

- If files being uploaded to VM/370 contain Line End, Line Delete, Character Delete, or Escape characters, then the specified actions for these characters are performed in the process of uploading files. For example, if the Escape character is set to the double quote mark ("), then double quote characters will be deleted from uploaded text. The following statement turns off the Line End, Line Delete, and Escape characters in VM/370:

  ```
  TERMINAL ESCAPE OFF LINEND OFF LINEDEL OFF
  ```

  If the Character Delete character was changed to Backspace (as described in the section "Using the Backspace Key" in this chapter), then the possibility of a character deleting the previous character is unlikely.

- You should also turn off the CMS BLIP character when transferring files to VM/370. You can turn off the BLIP with the CMS command:

  ```
  SET BLIP OFF
  ```

## Download

- For downloading, files on VM/370 can be either fixed or variable length.

- Some modifications of files can take place during transmission. Because a single line in a host computer file may contain multiple Carriage Return characters, and because a Carriage Return character always terminates a file line on the IBM Personal Computer, downloading may translate a host file line into two or more IBM Personal Computer file records.

- Only files with a line length of 160 characters or less can be downloaded.

- In downloading a file from VM/370, cents sign characters in the file are lost in transmission. The ASCII character set does not have a corresponding character, so VM/370 deletes these characters during EBCDIC-to-ASCII translation.

If you are using the VM/370 EDIT EXEC described above, you do not need to perform the following steps.

- For downloading files, the terminal linesize must be set in VM/370 so that it is larger than the longest line of any file to be downloaded. If, as discussed in "Setting the Linesize" in this chapter, the LINESIZE has been set to 255, no problems will occur.

- When downloading files, if messages are displayed on your terminal, they may appear as lines in the downloaded file. Thus, after you have downloaded a BASIC program you may find in the middle of your program a statement like:

Hi Charlie, Please send me your version of Zorphwar. Joe

You can suppress such messages with the VM/370 command:
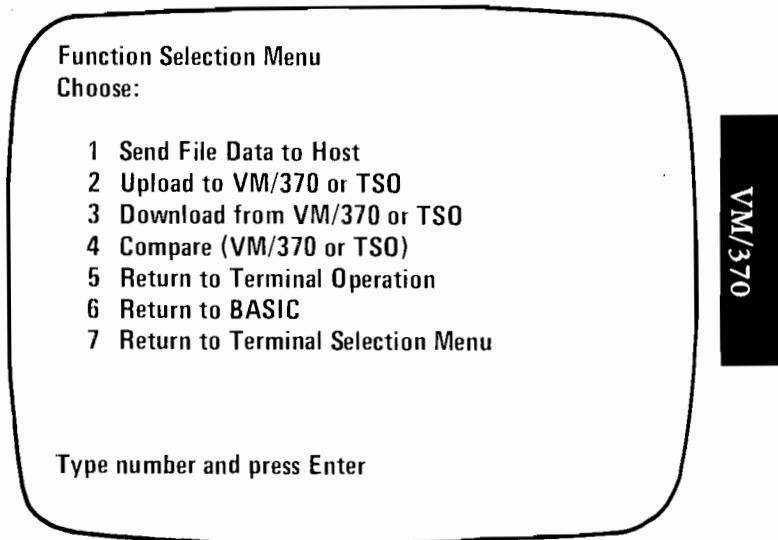
SET MSG OFF WNG OFF

Note: Setting WNG OFF cuts off warning messages from the operator.

# Uploading a File

To upload a file from the IBM Personal Computer to your VM/370 host system, perform the following steps:

1. Start up the IBM Personal Computer as a VM/370 terminal and log onto VM/370.

2. Get to a point on VM/370 where pressing the Enter ( ⏎ ) key gives you the message CMS. For example, after an IPL CMS, you should press the Enter ( ⏎ ) key again to complete the CMS startup.

3. Press the [F2] key to obtain the Function Selection Menu:

```
Function Selection Menu
Choose:

    1  Send File Data to Host
    2  Upload to VM/370 or TSO
    3  Download from VM/370 or TSO
    4  Compare (VM/370 or TSO)
    5  Return to Terminal Operation
    6  Return to BASIC
    7  Return to Terminal Selection Menu



Type number and press Enter
```

VM/370

4. Enter the number 2 to select Upload to VM/370 or TSO.

5.  When requested, enter the name of the file that you wish to upload. Enter the full name of the file, including any extension. (Remember, the filename format is [*d:*]*filename.ext*.)

    For example, to upload a BASIC program called MYPROG, enter the filename as B:MYPROG.BAS. If you do not enter a drive specifier, the file is assumed to be on the default drive. If the specified file does not exist, you receive a message to that effect. You can then specify another filename or return to the Function Selection Menu.

6.  When requested, enter the name of the file where you wish the file to be saved on VM/370. Specify this name using the format for VM/370 filenames. For example, specify *filename filetype* (and optionally) *filemode*. If the file already exists on VM/370, an error message is given. You may specify another filename, or return to the terminal mode of operation and erase the file before uploading.

7.  If the filename is accepted by VM/370, the message **Host ready for input** appears, and the transfer of lines of text from the file on the IBM Personal Computer begins. The number of the line currently being transferred appears in the lower right-hand corner of the screen.

    When all the lines in the file are transferred, you see the message **Upload completed**. Press Enter ((←)) to return to terminal operation.

**Notes:**

1.  To end uploading at any point, press the ⌷F1⌷ (Communications Attention) key. Uploading ends with a message indicating how many lines of text were transferred. If termination does not occur within a few seconds, press the ⌷F1⌷ key again.

2.  If uploading ends abnormally, or if the host system is unable to save the file that you created, you can cancel the upload (the file on the host system is lost). Or, you can enter terminal operation in the host system editor and attempt to recover the uploaded file.

3.  If the number indicating the current file line being transferred stops changing, or if a **Line disconnected** message appears on the bottom of the screen, you have probably been disconnected from the host computer.

4.  If the uploading process stops in midstream (due to a disconnect from the host computer, for example), you can get back to terminal operation after pressing the ⌷F1⌷ key.

# Downloading a File

To download a file from VM/370 to an IBM Personal Computer perform the following steps:

1.  Start up your IBM Personal Computer as a VM/370 terminal and log onto VM/370.

VM/370

2.  Get to a point on VM/370 where pressing the Enter (⏎) key gives you the message **CMS**. For example, after an IPL CMS, you should press the Enter (⏎) key again to complete the CMS startup.

3.  Press ⌈F2⌉ to obtain the Function Selection Menu:

```
Function Selection Menu
Choose:

     1  Send File Data to Host
     2  Upload to VM/370 or TSO
     3  Download from VM/370 or TSO
     4  Compare (VM/370 or TSO)
     5  Return to Terminal Operation
     6  Return to BASIC
     7  Return to Terminal Selection Menu


Type number and press Enter
```

4.  Enter the number 3 to select **Download from VM/370 or TSO.**

5.  When requested, enter the name of the file on your IBM Personal Computer where you want the downloaded file to be saved. If this file exists already, you will be given a choice to overwrite, append, or leave the file as it is. Enter the full name of the file (including any extension). (Remember, the filename format is [*d:*]*filename.ext.*) If you do not enter a drive specifier, the file is saved on the default drive. If your IBM Personal Computer is unable to open the named file, a message is given. You may then specify another filename or return to the Function Selection Menu.

6. When requested, enter the name of the file on VM/370 that you wish to download. Specify the name using the VM/370 filename format. If the file does not exist on the host system, you will receive an error message. Again, you may specify another filename or return to the Function Selection Menu.

7. If the file exists and can be accessed, the message **Host file accessed** appears, and the transfer of lines begins. The number of the file line currently being downloaded appears in the lower right-hand corner of the screen.

   On completion of downloading, you see the message **Download completed**. Press Enter ($\leftarrow$) to return to terminal operation.

**Notes:**

1. To end Download at any time, press the $\boxed{\text{F1}}$ (Communications Attention) key. Downloading ends with a message indicating how many lines of text were downloaded. If termination does not occur within a few seconds, press $\boxed{\text{F1}}$ again.

2. Other errors (such as **Lack of local file space**) can end downloading prematurely. The error causing the termination and the point at which it occurred are given. The portion of the file already transferred is saved on your IBM Personal Computer.

3. If the number indicating the current file line being transferred stops changing, or if a **Line disconnected** message appears on the bottom of the screen, you have probably been disconnected from the host computer.

VM/370

4.  If the downloading process stops in midstream
    (due to a disconnect from the host computer,
    for example), you can return to terminal
    operation after pressing the $\boxed{\text{F1}}$ key.

5.  If you specify LPT1 as the name of the local file,
    the host file is printed on the parallel printer
    rather than written on a file.

# Comparing Files

The Compare function compares lines brought
down from the host computer with the lines in a
specified IBM Personal Computer file. To compare
two files, perform the following steps:

1.  When running as a terminal on VM/370, press
    the $\boxed{\text{F2}}$ key. The Function Selection Menu
    appears:

```
Function Selection Menu
Choose:

    1  Send File Data to Host
    2  Upload to VM/370 or TSO
    3  Download from VM/370 or TSO
    4  Compare (VM/370 or TSO)
    5  Return to Terminal Operation
    6  Return to BASIC
    7  Return to Terminal Selection Menu



Type number and press Enter
```

2. Enter the number 4 to select **Compare** (**VM/370 or TSO**).

3. When requested, give the name of the IBM Personal Computer file you wish to compare. (Remember, the filename format is [*d:*]*filename.ext.*) If you do not enter a drive specifier, the file is assumed to be on the default drive. If this file does not exist, you see an error message. You can specify another filename or return to the Function Selection Menu.

4. When requested, enter the name of the file on the host system that you wish to compare. Enter the filename using the conventions for downloading. If this file does not exist, you see an error message. You can specify another filename or return to the Function Selection Menu.

5. If the specified file exists, comparison of lines begins. During comparison, the number of the host system line being compared is displayed in the lower right-hand corner of the screen.

   If the files compare successfully, the message **Comparison successful** appears. If two lines do not compare, comparison stops and the two unequal lines are displayed. Errors in differing file lengths (for example, if the host file runs out of lines before the local file) are also indicated.

6. After either a successful comparison or a detected error, press the Enter (⏎) key to return to terminal operation.

7. To end comparison at any time, press the F1 (Communications Attention) key. Comparison terminates with a message indicating where comparison stopped in each of the files.

VM/370

8. If the number indicating the current file line being transferred stops changing or if a Line disconnected message appears on the bottom of the screen, you have probably been disconnected from the host computer.

9. If the comparing process stops in midstream (due to a disconnect from the host computer, for example), you can return to terminal operation after pressing the ⏹F1 key.

# Uploading and Downloading BASIC Programs

One use of the Upload and Download facilities of the Communications Program is the transfer of BASIC programs between your IBM Personal Computer and VM/370. This section is a short summary of rules and suggestions you should follow when writing and transferring such programs. Many of these rules are discussed elsewhere in this manual as well.

When writing BASIC programs on your IBM Personal Computer for uploading to run on VM/370, make sure you understand any limitations of BASIC on that host system. Such limitations include not only language features but also the physical format of statements. In particular, you must consider the length of a line that will be accepted by the host BASIC language (in addition to the limit of 130 characters per line built into the Upload function and 160 characters for Download).

● Before uploading a BASIC file, make sure it is saved as an ASCII file. For example, if you have just written a new version of a program called CHESS on your IBM Personal Computer and

wish to run it on your host system, then before uploading it, save it with the command:

SAVE "CHESS",A

- When downloading a BASIC program, save the file on the IBM Personal Computer with an extension of .BAS. As an example, suppose you are downloading a program ZORPH from a host system. When you are asked for the name of the IBM Personal Computer file where it is to be saved, enter the name:

B:ZORPH.BAS

The downloaded file is saved on the file ZORPH.BAS on drive B. When you wish to load the program to run it on the IBM Personal Computer, enter the BASIC command:

LOAD "B:ZORPH"

- When you attempt to load or run a BASIC program after downloading, you may receive the BASIC error message **Direct Statement in File**. This message means that a statement without a line number occurs in the file. Such statements may show up in a BASIC file as either a title on the front of the file, a line that is a continuation of a line with a line number, or a message that was transmitted to you while you were downloading.

To determine where the direct statement is in your BASIC program, list the program. The stowaway direct statement is usually the next line beyond the last statement listed. To delete direct statements from a BASIC program file, use EDLIN (the editor provided with the Disk Operating System).

- If, after downloading a host program file, you discover that lines in the program were broken into shorter lines (with the second portion of these lines appearing as direct statements), you may not have set the terminal linesize large enough on your host system. See the prior section in this chapter "Setting the Linesize" for more details about setting terminal linesize.

# Other Terminal Specification File

On the Terminal Feature Menu, you can change only three terminal parameters: the line bit rate, type of parity checking, and line turnaround character sent to host. Occasionally, you may need to change other parameters.
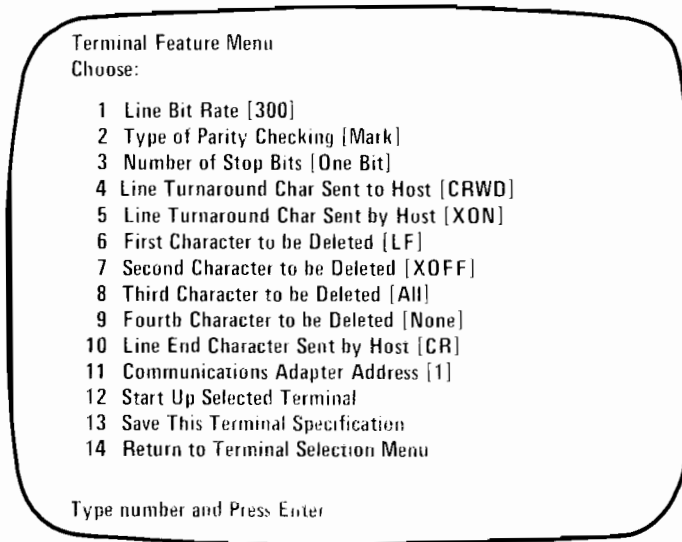
If you need to change some other parameters, when you get the Terminal Selection Menu on program startup, enter 6 to request **Other Terminal Specification File**.

The Communications Program asks you to enter the name of the file where the specification is stored. Enter the name **VMMOD**. (If you have stored your specifications in another file, see "Saving a Terminal Specification" later in this chapter.)

VMMOD is a file on the Communications Program diskette that contains the default parameters for a VM/370 terminal.

> **Note:** The actual filename on the diskette is VMMOD.TER, but do not enter the .TER. The Communications Program adds .TER to the filename you enter.

VMMOD.TER is loaded, and you see the following
Terminal Feature Menu, which shows all of the
default values in brackets [ ]:

```
Terminal Feature Menu
Choose:

     1  Line Bit Rate [300]
     2  Type of Parity Checking [Mark]
     3  Number of Stop Bits [One Bit]
     4  Line Turnaround Char Sent to Host [CRWD]
     5  Line Turnaround Char Sent by Host [XON]
     6  First Character to be Deleted [LF]
     7  Second Character to be Deleted [XOFF]
     8  Third Character to be Deleted [All]
     9  Fourth Character to be Deleted [None]
    10  Line End Character Sent by Host [CR]
    11  Communications Adapter Address [1]
    12  Start Up Selected Terminal
    13  Save This Terminal Specification
    14  Return to Terminal Selection Menu

Type number and Press Enter
```

You can change any of the parameters on this screen,
or you can start up the terminal as specified. For
example, the default number of stop bits is **One Bit**.
If you wish to specify another number of stop bits,
enter 3. Then enter the number you want when the
next screen appears.

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# Half Duplex Operation

The Communications Program allows the IBM
Personal Computer to operate as a terminal while
connected to a host in half duplex operation. *Half
duplex* operation allows communications in both
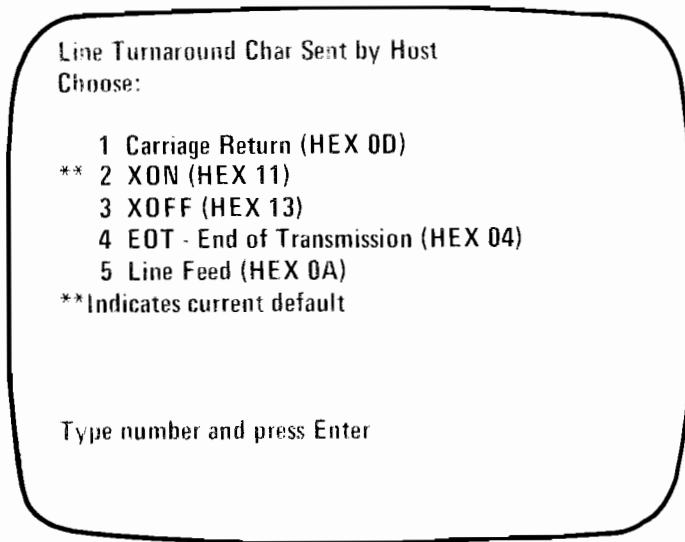directions, but data can pass in only one direction at
a time.

With half duplex operation, you need to specify one
additional terminal parameter, the line turnaround
character sent by the host. This parameter is used
only for half duplex operation. It signifies that the
host computer has completed its response and will
not transmit any more information until it receives a
line of input from the IBM Personal Computer.

The output from the host may, however, contain
more than one line of text; these lines are separated
by line end characters. (See "Line End Character
Sent by Host" in Chapter 6.)

The **Line Turnaround Character Sent by Host** must
be a character that occurs only once and at the end of
a transmission from the host system. Since the host
system may send a number of lines before it has
finished transmission, the Carriage Return is usually
not a valid line turnaround character from the
host.

> IMPORTANT:   Using half duplex terminal
> operation does not affect the Half Duplex/Full
> Duplex setting on your modem. *Only full duplex
> modems are supported, so always use the Full Duplex
> setting.*

When you select **Line Turnaround Char Sent by Host**, you are given the following menu:

```
Line Turnaround Char Sent by Host
Choose:

     1 Carriage Return (HEX 0D)
**   2 XON (HEX 11)
     3 XOFF (HEX 13)
     4 EOT - End of Transmission (HEX 04)
     5 Line Feed (HEX 0A)
** Indicates current default




Type number and press Enter
```

Select the Line Turnaround Character produced by the host system you are using. It must be a unique character that appears at the end of transmission from the host system.

Refer to Chapter 6 for a complete description of the different parameters.

## Saving a Terminal Specification

After you have made all of your changes on the Terminal Feature Menu, you can save your new specifications in a file. To do so, enter **13** for Save **This Terminal Specification**.

The Communications Program asks you to enter the name of the file where you wish to save the specification. Enter any valid filename *except* VMMOD.

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If the filename you enter already exists, you are asked if you wish to overwrite the file or exit. If you choose to exit, you can try to save the file again with a different name.

From now on, whenever you want to use the specification you have saved, you enter *your* filename for the Other Terminal Specification File.

For example, on the Terminal Selection Menu, enter **6** for **Other Terminal Specification File.** Then when you are asked to enter the name of the file, enter the name you have saved your specification file in.

# Return to Terminal Selection Menu

If you wish to return to the Terminal Selection Menu (if you entered the wrong terminal type or want to run as another type of terminal), enter **6** on the Terminal Feature Menu.

# How to Log Off VM/370

Specific logoff procedures are provided in your VM/370 instruction books or by your system programmer. The general procedure follows:

1.  Return to CP or CMS command level.

2.  Type **LOGOFF.** You see the VM/370 logoff message and are disconnected from the host system.

    > **Note:** When logging off VM/370 and using a modem, use the CP LOGOFF HOLD command if you wish to maintain the dial-up VM/370 connection after logoff.

# CHAPTER 5. TSO OPERATION

## Contents

MVS/TSO

# What Is MVS/TSO?

The third choice on the Terminal Selection Menu is
**TSO Terminal**. MVS/TSO is a system control
program that operates on an IBM computer
equipped with appropriate communications
hardware.

The Asynchronous Communications Support
Program allows you to communicate with most
MVS/TSO system control programs that operate on
an IBM computer. However, some installations may
have a modified version of MVS/TSO with which the
Communications Program will not work. Refer to
Appendix D, "Protocols," for specific protocol
information.

Access to this system can be either by local cable
connection or over remote telephone lines.

Once you are connected and operating as an
MVS/TSO terminal, we assume that you are familiar
with MVS/TSO operations. If you have questions on
particular MVS/TSO operations, refer to the
instruction manuals you received with that system or
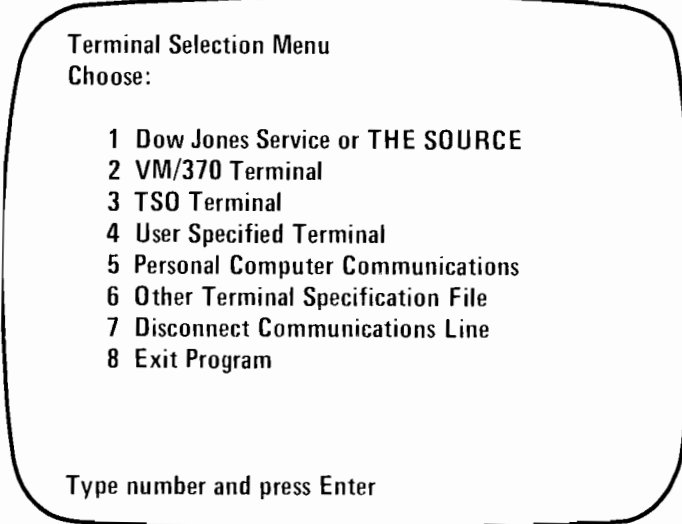contact your system programmer.

# How Do You Access It?

If you are unfamiliar with the Communications Program, we suggest that you read through all of this chapter before you try to operate as an MVS/TSO terminal. You will want to determine your terminal features before you begin to specify them in the program.

To access MVS/TSO and operate as an MVS/TSO terminal, make sure the cables and modem, if used, are connected as described in Chapter 1. Then turn on your computer and load the Communications Program. (See "Loading the Communications Program" in Chapter 2 for instructions.)

After the program loads, your screen looks like this:

```
Terminal Selection Menu
Choose:

    1 Dow Jones Service or THE SOURCE
    2 VM/370 Terminal
    3 TSO Terminal
    4 User Specified Terminal
    5 Personal Computer Communications
    6 Other Terminal Specification File
    7 Disconnect Communications Line
    8 Exit Program



Type number and press Enter
```
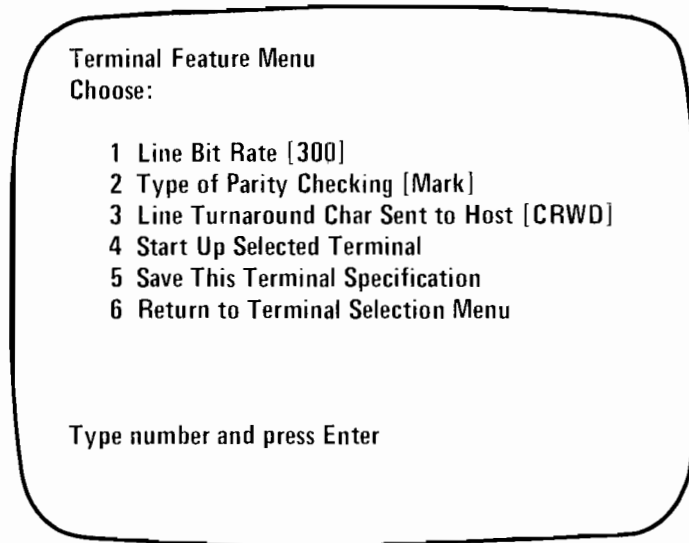
Now perform the following steps:

1.   Type the number 3 and press the Enter (⏎) key.

The following menu appears on the screen:

```
Terminal Feature Menu
Choose:

    1 Line Bit Rate [300]
    2 Type of Parity Checking [Mark]
    3 Line Turnaround Char Sent to Host [CRWD]
    4 Start Up Selected Terminal
    5 Save This Terminal Specification
    6 Return to Terminal Selection Menu


Type number and press Enter
```

This is the Terminal Feature Menu. From this menu, you can change the line bit rate, indicate the type of parity checking and line turnaround character sent to the host, start up your terminal, save your terminal specification in a file, or return to the Terminal Selection Menu.

The items in brackets on the menu are *defaults*, which you get when you start up. These default values are selected because most MVS/TSO systems run with these values. You probably do not need to change them.

2.    The line bit rate represents the number of characters sent across the communications line. The default line bit rate is 300 bits per second (bps). If you do not need to change your line bit rate, go on to Step 3.

For example, if you want to specify 1200 bps for your computer, type the number 1 and press the Enter ($\leftarrow$) key. You see the following menu:

```
Line Bit Rate (Bits/Sec)
Choose:

    1  75
    2  110
    3  150
 ** 4  300
    5  600
    6  1200
    7  1800
    8  2400
    9  4800
   10  9600
 ** Indicates current default



Type number and press Enter
```
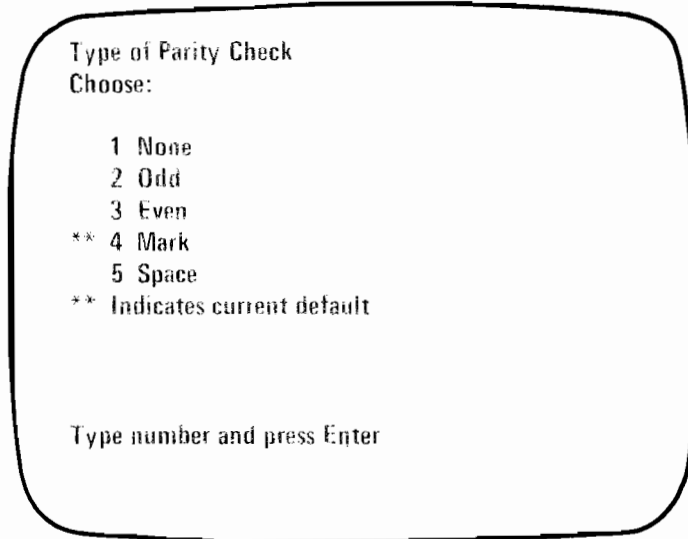
The ** next to the 300 indicates that the MVS/TSO terminal will start up with a communications line speed of 300 bits per second (bps), often called 300 baud, unless you change it. This is the default value.

Type the number for the line speed you are using. For example, if you are connecting to a 1200 bps computer port, type the number 6 and press the Enter ($\leftarrow$) key. This sets the line bit rate to 1200 bps. The Terminal Feature Menu appears on the screen again.

3.  Parity checking uses a binary digit added to each character to check what is sent between your IBM Personal Computer and the host. The default value on the menu for the type of parity checking to be performed on the characters sent between your IBM Personal Computer and

MVS/TSO is **Mark**. If your system is not communicating with mark parity, type the number **2** and press the Enter ($\leftarrow$) key.

The following menu is displayed:

```
Type of Parity Check
Choose:

       1  None
       2  Odd
       3  Even
 **    4  Mark
       5  Space
 **  Indicates current default




Type number and press Enter
```

MVS/TSO usually uses mark parity. If your host system uses another type of parity check, type the number you want and press the Enter ($\leftarrow$) key. See "Type of Parity Checking" in Chapter 6 for the meaning of the different types of parity checks. Pressing Enter ($\leftarrow$) returns you to the Terminal Feature Menu.

4.  You can specify one other parameter on the Terminal Feature Menu for an MVS/TSO terminal, the line turnaround character sent to host. For information on how to change other parameters, see "Other Terminal Specification File" later in this chapter.

    The default for the line turnaround character sent to host is CRWD, which stands for *Carriage Return Without a new Display line.*

If you select this option, when you press the
Enter (⏎) key at the end of an input line, the
program waits for a response from MVS/TSO
before moving the cursor to the next line.
Operating in this way eliminates blank lines on
the screen and lets you see more of your
terminal session.

If you wish to have the cursor move to the next
line on input, enter number 3 on the Terminal
Feature Menu. You see the following menu:

```
Line Turnaround Char Sent to Host
Choose:

        1 Carriage Return (HEX 0D)
        2 XON (HEX 11)
        3 XOFF (HEX 13)
        4 EOT – End of Transmission (HEX 04)
        5 Line Feed (HEX 0A)
   **   6 CR Without New Display Line
   **   Indicates current default




Type number and press Enter
```
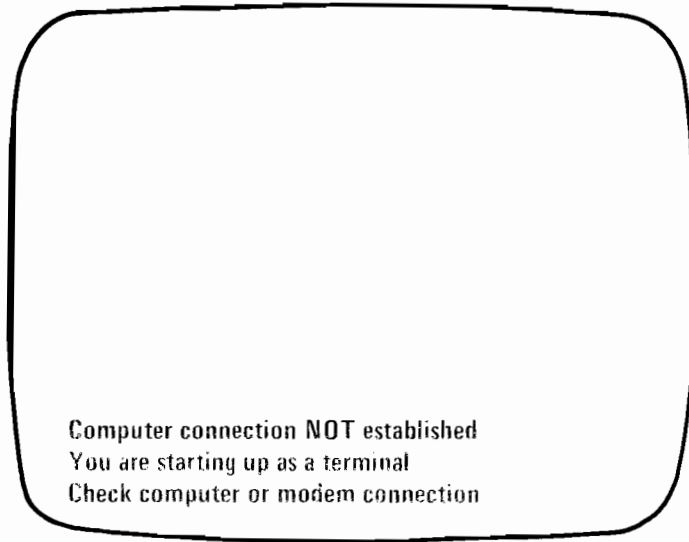
To have the cursor move to the next line on
input, enter the number 1. Pressing the Enter
(⏎) key returns you to the Terminal Feature
Menu.

5.  Type the number 4 on the Terminal Feature
    Menu for **Start Up Selected Terminal**, and
    press the Enter (⏎) key.

    This tells your IBM Personal Computer that you
    are ready to start up as a terminal.

6.  You see the following message on your screen:

```
Computer connection NOT established
You are starting up as a terminal
Check computer or modem connection
```

> Note: The first line of this message may not appear on your screen.

7.  Now you make your phone connection. Follow the instructions in Chapter 2 under "Connecting to a Host Computer."

    After the connection is made, you may hear a "beep" and see the following message on the bottom line of the screen:

    Line connected

    This message indicates that the host is ready to talk to you. You may have a short delay before this message appears, so wait at least 30 seconds for it. However, you won't see this message if your connection is already established.

MVS/TSO

You should see a request for logon from the
MVS/TSO system. If you do not see this
request, press Enter ($\leftarrow$), and wait for the
message.

> Note:   If, instead of this message, you see
> a string of meaningless characters, you
> probably are using the wrong line speed.

9.   When you receive the request for logon, follow
your usual logon procedure for TSO.

After your logon messages, TSO replies with
the word **READY**. The **READY** indicates that
you have successfully logged onto TSO.

# Special Terminal Features

## Using the Backspace Key

You probably want to be able to use the Backspace
($\leftarrow$) key on your keyboard for correcting errors.

When you press the Backspace ($\leftarrow$) key, the cursor
on the screen moves back one space. A backspace
character (Hex 08) is transmitted to the TSO system.

By setting the Character Delete character in TSO
equal to the backspace character, you can backspace
over characters on an input line and delete the
corresponding characters that were sent to TSO. To
set the Character Delete character while in TSO,
type the following:

PROFILE CHAR(BS)

Then press the Enter ($\leftarrow$) key.

From now on, you can correct errors with the
Backspace ((←)) key.

Changing the Character Delete character in this
fashion may or may not permanently change it in
your profile. If it does permanently change the
profile, then the next time you log onto your
MVS/TSO system, you will not need to reenter this
PROFILE statement.

> Note:   On some TSO systems it may not be
> possible to set the delete character to
> backspace. If this command fails to have the
> desired effect, check with your TSO support
> group.

# Setting the Linesize

When operating the IBM Personal Computer as a
TSO terminal, the Communications Program
handles any length line up to 255 characters received
from the host system. When using Upload,
Download, or Compare, you must set the terminal
linesize in TSO to the maximum of 255 characters.
To do so, enter the following command:

TERMINAL LINESIZE (255)

You may wish to include this statement in a
command procedure. See "Using Command
Procedures" later in this chapter.

> Note:   Each time you disconnect from TSO
> and then log back onto TSO, you must reset the
> LINESIZE.

# Use of Special Keys for MVS/TSO

Before we go on to other TSO functions and the
logoff procedure, let's take a look at some special
keys.

## Function Keys

One function key has a special meaning when you
are using MVS/TSO:

Key Use

[F1] Press this key to return you to the prior level of
operation. For example, if you are trying to
enter the TSO Editor and you have failed to
enter a filetype, the TSO Editor prompts you
for a filetype. If you wish to escape without
responding to that prompt, press the [F1] key.

> **Note:** Do not try to use the [F1] key to
> disconnect from your host system. Instead,
> you should follow your usual MVS/TSO
> logoff procedure.

## The Enter key

You must press the Enter ([↵]) key whenever the
message on the screen tells you to *enter* or *type*
something. That is, you type the required entry and
then press the Enter ([↵]) key.

You also use the Enter ([↵]) key to tell MVS/TSO
that you have completed a line of input.

# Using the Function Selection Menu

With your IBM Personal Computer in the
SENDING state, press the [F2] key. The following
Function Selection Menu is then displayed:

```
Function Selection Menu
Choose:

    1 Send File Data to Host
    2 Upload to VM/370 or TSO
    3 Download from VM/370 or TSO
    4 Compare (VM/370 or TSO)
    5 Return to Terminal Operation
    6 Return to BASIC
    7 Return to Terminal Selection Menu



Type number and press Enter
```

The last three menu items were described in
Chapter 2.

The other items on this menu perform the following
functions:

1.  **Send File Data to Host** lets you send a copy of a
    file on your IBM Personal Computer to
    MVS/TSO. For information and instructions,
    refer to Chapter 8, "General File Transfers."

    In general, use the Upload facility to transfer
    files to MVS/TSO (option 2). In some rare cases,
    option 2 does not work, and then you should
    use option 1.

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2. **Upload to VM/370 or TSO** transfers a file from the IBM Personal Computer to an MVS/TSO host system. (See "Uploading a File" in this chapter.)

3. **Download from VM/370 or TSO** transfers a file from MVS/TSO to the IBM Personal Computer. (See "Downloading a File" in this chapter.)

4. **Compare (VM/370 or TSO)** compares a file on MVS/TSO with a file on the IBM Personal Computer.

# Transferring Files With TSO

Correct operation of the Upload, Download and Compare functions on TSO is dependent upon a number of parameters being set correctly. If these parameters are not set as specified, the file transfer operations will fail.

## TSO Profile Settings

Set the following parameters as indicated using the TSO PROFILE command:

NOPROMPT      Required for correct recovery from erroneous input.

| NOINTERCOM | Required to prevent messages that are sent to you by another TSO user from interfering with file transfers. |
|---|---|
| | **Note:** There is no way to stop Broadcast messages once you have logged onto TSO. |
| NOPAUSE | Required in some situations so TSO responses can be recognized by the transfer program. |
| NOMSGID | Required so the TSO Editor responses can be recognized by the transfer programs during initialization. |
| NOMODE | Required so transfer programs can properly synchronize with responses from the TSO Editor. |
| NOWTPMSG | Required to prevent write-to-programmer messages from interfering with file transfers. |

If you do not wish to operate with the above parameters as your defaults, we suggest that you write a TSO command procedure that can be used to set these values prior to starting file transfer operations.

In addition, for Download to operate properly in all cases, set the LINESIZE parameter with the following TERMINAL command to 255.

TERMINAL LINESIZE (255)

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# Using Command Procedures

MVS/TSO gives you a way to quickly set up profile and terminal parameters. By writing one or more command procedures, you can automatically set these parameters to standard values with a single command. You might want to use such command procedures in the following situations:

- If on your installation of TSO, a PROFILE command does not permanently change your profile settings.

- If you sometimes use your TSO account with a terminal other than your IBM Personal Computer.

- If you wish to use one set of profile settings when you are using TSO in a terminal session, and another set when you are uploading or downloading files.

For example, if you wish to set the parameters for running TSO from your IBM Personal Computer as a terminal by using a single command, use an MVS/TSO Editor to build the following command procedure file (assign the name **RUNPC.CLIST** to the file):

```
TERMINAL LINESIZE(255)
PROFILE CHAR(BS)
```

Each time you log onto TSO, enter **EXEC RUNPC**. The two instructions in this command procedure are then performed.

You might want to construct another command procedure to set the profile parameters (as previously described) for file transfers. You could call this procedure file **UPDOWN.CLIST**. Enter the procedure as follows:

```
TERMINAL LINESIZE(255)
PROFILE NOPROMPT NOINTERCOM NOPAUSE NOMSGID NOMODE NOWTPMSG
```

Before beginning a file transfer, you then set the correct parameters by entering **EXEC UPDOWN**.

You can also have another command procedure that restores your profile settings to the standard defaults. You would use this command procedure after you had finished a file transfer and wanted to return to normal terminal operation. For example, the command procedure might set **PROFILE INTERCOM** so you would receive messages from other **TSO** users.

# Rules of Operation for Upload, Download, and Compare

## General

- You cannot use quotes (") around a filename.

- You can enter filenames in either uppercase or lowercase letters.

- Blanks are not permitted in specifying filenames for uploading, downloading, or comparing.

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## Use of Unnumbered Files

Files that you upload, download, or compare must always be unnumbered. If you try to download a file with line numbers, the results are unpredictable. If you wish to download a TSO file that is numbered, access the file with the TSO Editor, and then save the file with the UNNUM option. This removes the line numbers. After you upload a file and wish to number it, use the TSO Editor RENUM subcommand to number it.

Note:   If you wish to preserve line numbers in transferring a file (for example, a BASIC program), use the general file transfer facilities described in Chapter 8.

# Upload

When you upload a file, you send a copy of the file from your IBM Personal Computer to MVS/TSO.

A file can only be uploaded to a file of filetype TEXT. This filetype must be specified as part of the filename using the dot (.) notation. Thus, MYFILE.TEXT would be a valid name for uploading. If you wish to upload a file of a type other than TEXT, upload to a TEXT file and then use the TSO RENAME command to change its name.

Notes:

1.   Renaming a file to a name with a filetype that requires all uppercase letters will not change the letters in the file to uppercase.

2.   Hyphens on the end of lines in a file being uploaded will be lost, due to a feature of the TSO Editor.

# Download

When you download a file, you receive a copy of the file on your IBM Personal Computer from MVS/TSO.

Any valid filetype may be specified for downloading. Place the filetype at the end of the filename using the dot (.) notation. Thus, ZORPH.DATA would be a valid name for a file to be downloaded from the host.

# Uploading a File

To upload a file from the IBM Personal Computer to TSO, peform the following steps:

1.  Start up the IBM Personal Computer as an MVS/TSO terminal and log onto TSO.

2.  Get to a point on TSO where pressing the Enter ($\leftarrow$) key gives you the **READY** prompt.

3.  Enter your PROFILE commands.

4.  Press the $\boxed{F2}$ key to obtain the Function Selection Menu:

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```
Function Selection Menu
Choose:

    1 Send File Data to Host
    2 Upload to VM/370 or TSO
    3 Download from VM/370 or TSO
    4 Compare (VM/370 or TSO)
    5 Return to Terminal Operation
    6 Return to BASIC
    7 Return to Terminal Selection Menu



Type number and press Enter
```

5.  Enter the number 2 to select Upload to
    VM/370 or TSO.

6.  When requested, enter the name of the file you
    wish to upload. Enter the full name of the file
    (including any extension). (Remember, the
    filename format is [*d*:] *filename.ext*.)

    For example, to upload a text file on the
    diskette in drive B called MYWORDS.TXT,
    enter the filename as B:MYWORDS.TXT. If
    you do not enter a drive specifier, the file is
    assumed to be on the default drive. If the
    specified file does not exist, you receive a
    message to that effect. You can then specify
    another filename or return to the Function
    Selection Menu.

7.  When requested, give the name of the file
    where you wish the file to be saved on TSO. You
    should specify this name using the format for
    TSO filenames. If the file already exists on the
    host system, an error message is given. You may
    specify another filename or return to the
    terminal mode of operation and erase the file
    before uploading.

8. If the filename is accepted by the host system, the message **Host** ready **for input** appears, and transfer of lines of text from the file on the IBM Personal Computer begins. The number of the line currently being transferred appears in the

When all the lines in the file are transferred, you see the message:

Upload completed

Notes:

1. To end uploading at any point, press the [F1] (Communications Attention) key. Uploading ends with a message indicating how many lines of text were transferred. If this fails to occur after several seconds, press the [F1] key a second time.

2. If uploading is abnormally ended or if the host system is unable to save the file that was created, you can cancel the upload (the file on the host system is lost). Or, you can enter terminal operation in the host system editor and attempt to recover the uploaded file.

3. If the number indicating the current file line being transferred stops changing or if a **Line disconnected** message appears on the bottom of the screen, you have probably been disconnected from the host computer.

4. If the uploading process stops in

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# Downloading a File

To download a file from TSO to an IBM Personal
Computer, perform the following steps:

1.  Start up your IBM Personal Computer as an
    MVS/TSO terminal and log onto TSO.

2.  Get to a point on TSO where pressing the Enter
    ($\leftarrow$) key gives you the **READY** prompt.

3.  Enter your PROFILE commands.

4.  Press the $\boxed{F2}$ key to obtain the Function
    Selection Menu:

```
Function Selection Menu
Choose:

      1 Send File Data to Host
      2 Upload to VM/370 or TSO
      3 Download from VM/370 or TSO
      4 Compare (VM/370 or TSO)
      5 Return to Terminal Operation
      6 Return to BASIC
      7 Return to Terminal Selection Menu




Type number and press Enter
```

5.  Enter the number 3 to select **Download from
    VM/370 or TSO.**

6. When requested, enter the name of the file on your IBM Personal Computer where you want the downloaded file to be saved. If this file exists already, you are given a choice to overwrite, append, or leave the file as it is. Enter the full name of the file (including any extension).

   Remember, the filename format is [*d*:] *filename.ext*. If you do not enter a drive specifier, the file is saved on the default drive. If your IBM Personal Computer is unable to open the named file, a message is given. Then you may specify another filename or return to the Function Selection Menu.

7. When requested, give the name of the file on TSO that you wish to download. You should specify the name using the MVS/TSO filename format. If the file does not exist on the host system, you receive an error message. Again, you may specify another filename or return to the Function Selection Menu.

8. If the file exists and can be accessed, the message **Host file accessed** appears, and the transfer of lines begins. The number of the file line currently being downloaded appears in the lower right-hand corner of the screen. On completion of downloading, you see the message **Download completed**.

   Pressing Enter ([←]) returns you to the Function Selection Menu.

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**Notes:**

1. To end Download at any time, press the [F1] (Communications Attention) key. Downloading ends with a message indicating how many lines of text were downloaded. If this does not occur within a few seconds, press [F1] again.

2. Other errors (such as **Lack of local file space**) can end downloading prematurely. The error causing the termination and the point at which it occurred are given. The portion of the file already transferred is saved on your IBM Personal Computer system.

3. If the number indicating the current file line being transferred stops changing, or if a **Line disconnected** message appears on the bottom of the screen, you have probably been disconnected from the host computer.

4. If the downloading process stops in midstream (due to a disconnect from the host computer, for example), you can return to terminal operation after pressing the [F1] key.

5. If you specify LPT1 as the name of the local file, the host file is printed on the parallel printer rather than written on a diskette file.

# Comparing Files

The Compare function compares lines brought down from the host computer with the lines in the specified IBM Personal Computer file.

To compare two files, perform the following steps:

1.  When running as a terminal on TSO, press [F2]. The following Function Selection Menu appears:

```
Function Selection Menu
Choose:

    1 Send File Data to Host
    2 Upload to VM/370 or TSO
    3 Download from VM/370 or TSO
    4 Compare (VM/370 or TSO)
    5 Return to Terminal Operation
    6 Return to BASIC
    7 Return to Terminal Selection Menu


Type number and press Enter
```

2.  Enter the number 4 to select **Compare (VM/370 or TSO)**.

3.  When requested, enter the name of the IBM Personal Computer file you wish to compare. (Remember, the filename format is [d:] *filename.ext*.) If no drive specifier is given, the file is assumed to be on the default drive. If this file does not exist, you get an error message. You can specify another filename or return to the Function Selection Menu.

4.   When requested, enter the name of the file on TSO that you wish to compare. Enter the filename using the MVS/TSO conventions for downloading. If this file does not exist, you get an error message. You can specify another filename or return to the Function Selection Menu.

5.   If the specified file exists, comparison of lines begins. During comparison, the number of the host system line being compared is displayed in the lower right-hand corner of the screen. If the files compare, you see a message to that effect. If two lines do not compare, comparison stops and the two unequal lines are displayed. Errors in differing file lengths (for example, if the host file runs out of lines before the local file) are also indicated.

6.   After either a successful comparison or a detected error, you return to terminal operation.

   **Notes:**

   1.   To end comparison at any time, press the [F1] (Communications Attention) key. Comparison terminates with a message indicating where comparison stopped in each of the files.

   2.   If the number indicating the current file line being transferred stops changing or if a **Line disconnected** message appears on the bottom of the screen, you have probably been disconnected from the host computer.

   3.   If the comparing process stops in midstream (due to a disconnect from the host computer, for example), you can return to terminal operation after pressing the [F1] key.

# Other Terminal Specification File

On the Terminal Feature Menu, you can change only three terminal parameters: the line bit rate, type of parity checking, and line turnaround character sent to host. Occasionally, you may need to change other parameters.

If you need to change some other parameters, when you get the Terminal Selection Menu on program startup, enter 6 to request **Other Terminal Specification File.**

The Communications Program asks you to enter the name of the file where the specification is stored. Enter the name **TSOMOD.** (If you have stored your specifications in another file, see "Saving a Terminal Specification" later in this chapter.)

TSOMOD is a file on the Communications Program diskette that contains the default parameters for an MVS/TSO terminal.

> **Note:** The actual filename on the diskette is TSOMOD.TER, but do not enter the .TER. The Communications Program adds .TER to the filename you enter.

TSOMOD.TER is loaded, and you see the following Terminal Feature Menu, which shows all of the default values in brackets [ ]:

```
Terminal Feature Menu
Choose

   1 Line Bit Rate [300]
   2 Type of Parity Checking [Mark]
   3 Number of Stop Bits [One Bit]
   4 Line Turnaround Char Sent to Host [CRWD]
   5 First Character to be Deleted [CR]
   6 Second Character to be Deleted [XON]
   7 Third Character to be Deleted [XOFF]
   8 Fourth Character to be Deleted [All]
   9 Line End Character Sent by Host [LF]
  10 Communications Adapter Address [1]
  11 Start Up Selected Terminal
  12 Save This Terminal Specification
  13 Return to Terminal Selection Menu


Type number and Press Enter
```

You can change any of the parameters on this
screen, or you can start up the terminal as specified.
For example, the default number of stop bits is **One
Bit**. If you wish to specify another number of stop
bits, enter **3**. Then enter the number you want when
the next screen appears.

Refer to Chapter 6 for a complete description of the
different parameters.

# Saving a Terminal Specification

After you have made all of your changes on the
Terminal Feature Menu, you can save your new
specifications in a file. To do so, enter **12** for
**Save This Terminal Specification**.

The Communications Program asks you to enter the
name of the file where you wish to save the
specification. Enter any valid filename *except*
TSOMOD.

If the filename you enter already exists, you are asked if you wish to overwrite the file or exit. If you choose to exit, you can try to save the file again with a different name.

From now on, whenever you want to use the specification you have saved, you enter *your* filename for the Other Terminal Specification File.

For example, on the Terminal Selection Menu, enter 6 for **Other Terminal Specification File.** Then when you are asked to enter the name of the file, enter the name you have saved your specification file in.

# Return to Terminal Selection Menu

If you wish to return to the Terminal Selection Menu (if you entered the wrong terminal type or want to run as another type of terminal), enter 6 on the Terminal Feature Menu.

# How to Log Off MVS/TSO

Specific logoff procedures are provided in your MVS/TSO manuals or by your system programmer. The general procedure follows:

1. Type **QUIT** from any menu prompt. This returns you to the *command level*.

2. Type **LOGOFF.** You will see the MVS/TSO logoff message and will be disconnected from the host system.

> **Note:** When logging off MVS/TSO and using a modem, use the LOGOFF HOLD command if you wish to maintain the dial-up TSO connection after logoff.

# CHAPTER 6. USER SPECIFIED TERMINAL

## Contents

# Operating as a
# User Specified Terminal

To run the Communications Program, you operate as a full duplex terminal. A full duplex terminal can access a wide variety of computer systems that provide 8-bit ASCII support. With this support, 7 bits of each transmitted character are used for the 7-bit ASCII code. The 8th bit is either left as a 0, or used as a parity bit.

When operating as a full duplex terminal, each character typed on your keyboard is transmitted to the host when it is typed. Each character received from the host is displayed when it is received. You may select whether or not characters you type are displayed on the screen as you type them. It is thus possible, for example, to run with a host system that echoes back for display each character that it receives from your IBM Personal Computer. (See "Local or Host Character Echoing" later in this chapter for more information.)

Before you access such a system, determine the following characteristics of the system (you may want to write the values here for reference):

_____ The line bit rate of the input port being accessed

_____ The type of parity checking used

_____ The number of stop bits used

_____ Whether characters are echoed by the host system

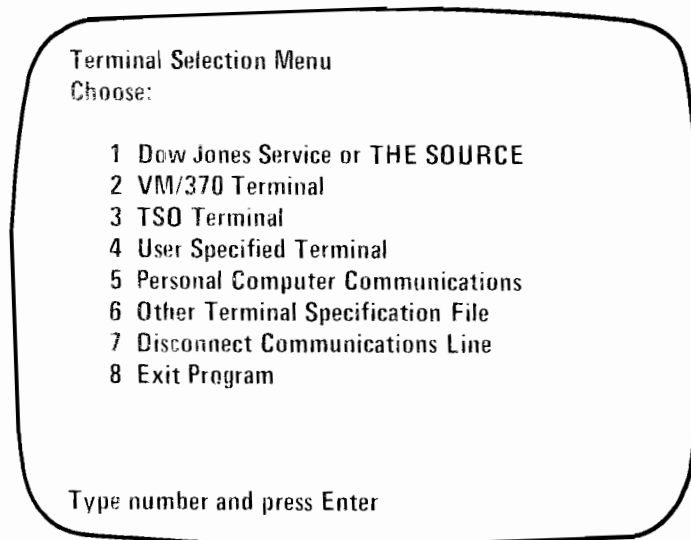_____ Whether the XON/XOFF protocol is used

You can sometimes determine these parameters by trial and error, but it is best to obtain them from the person responsible for host communications at your host location before you try to access a particular host system.

The *user specified* means that you specify all of the terminal features to make your IBM Personal Computer operate as a terminal for your particular host system.

# How Do You Use It?

To set up and operate as a user specified full duplex terminal, make sure the cables and modem, if used, are connected as described in Chapter 1. Then turn on your computer and load the Communications Program. (See "Loading the Communications Program" in Chapter 2 for instructions.)

After the program loads, your screen should look like this:

```
Terminal Selection Menu
Choose:

        1 Dow Jones Service or THE SOURCE
        2 VM/370 Terminal
        3 TSO Terminal
        4 User Specified Terminal
        5 Personal Computer Communications
        6 Other Terminal Specification File
        7 Disconnect Communications Line
        8 Exit Program



    Type number and press Enter
```
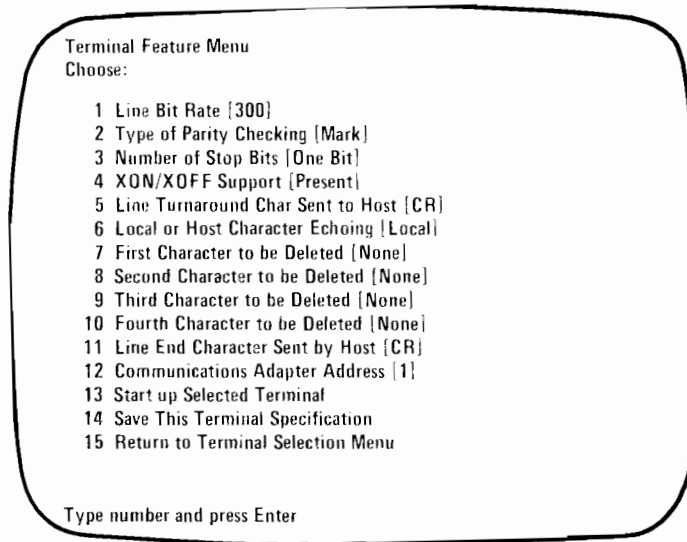
Now type the number 4 and press the Enter ($\boxed{\leftarrow}$)

key.

# The Terminal Feature Menu

The following Terminal Feature Menu appears on the screen:

```
Terminal Feature Menu
Choose:

    1  Line Bit Rate [300]
    2  Type of Parity Checking [Mark]
    3  Number of Stop Bits [One Bit]
    4  XON/XOFF Support [Present]
    5  Line Turnaround Char Sent to Host [CR]
    6  Local or Host Character Echoing [Local]
    7  First Character to be Deleted [None]
    8  Second Character to be Deleted [None]
    9  Third Character to be Deleted [None]
   10  Fourth Character to be Deleted [None]
   11  Line End Character Sent by Host [CR]
   12  Communications Adapter Address [1]
   13  Start up Selected Terminal
   14  Save This Terminal Specification
   15  Return to Terminal Selection Menu


Type number and press Enter
```

## Notes:

1.  You need to understand some technical concepts to determine what the settings should be for some of the items in this menu. If you are unfamiliar with these concepts, someone at the computer center where your host computer is located should be able to help you. Another good way to determine settings is to check the equivalent setting on an ASCII terminal that you *know* works with the host computer you are planning to use.

2.  The values given in brackets [ ] are the current default values for each of the features.

# Line Bit Rate

The line bit rate describes the rate (speed) at which characters are sent on the transmission line. The higher this rate, the faster the transmission will be. Generally, this rate is determined by the bit rate that the transmission equipment can handle and/or the bit rates available at the input ports for the computer being accessed.

The default line bit rate is 300 bits per second (bps). If you are using another line bit rate for your computer, enter the number 1 on the Terminal Feature Menu. The following menu appears:

```
Line Bit Rate (Bits/Sec)
Choose:

      1  75
      2  110
      3  150
**    4  300
      5  600
      6  1200
      7  1800
      8  2400
      9  4800
     10  9600
**  Indicates current default


Type number and press Enter
```
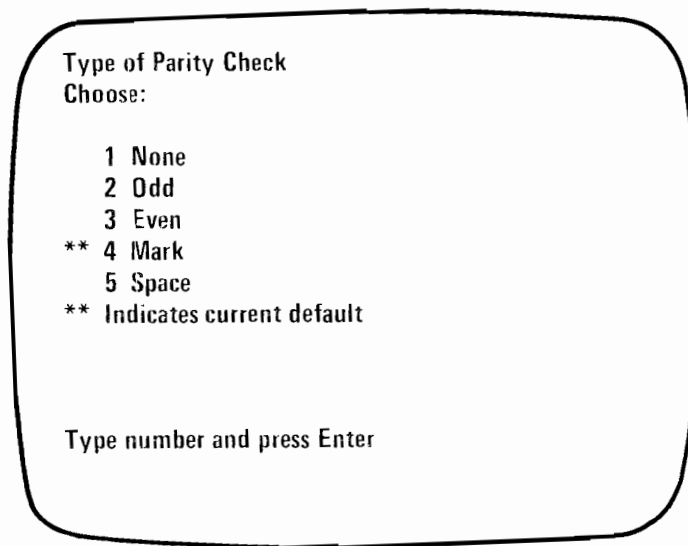
**Notes:**

1.  Bit rates are often referred to as *baud* rates. Thus, a 300 *baud acoustic coupler* transmits at 300 bits/second.

2.  While higher bit rates can be selected, operation without a loss of data is supported only for rates of 2400 bits/second and lower, except when listing or saving host output on a file on your IBM Personal Computer. See Chapter 8 for line bit rate limitations when printing or saving a file. Listing a file on the printer is supported only for rates of 300 bits/second and lower.

# Type of Parity Checking

Characters transmitted over an asynchronous communications line are sent serially as sequences of ones and zeroes (sent as two different voltage levels) that represent each character. The *parity bit* is the 8th bit of the ASCII character code and is added to the 7-bit code, depending on your selection, so that the character may be checked for accuracy at the receiving end. Set the parity to match the type expected by the host computer.

To set the parity bit, enter the number 2 on the
Terminal Feature Menu. The following menu
appears:

```
Type of Parity Check
Choose:

     1 None
     2 Odd
     3 Even
**   4 Mark
     5 Space
**  Indicates current default



Type number and press Enter
```

The types of parity check are:

**None**  No parity bit is added to the character
transmitted. Eight bits of data are
transmitted for each character.

All 8 bits, including the parity bit, of each
character are returned to the
Communications Program. Unless the host
computer is always transmitting a 0 parity
bit, you will see unrecognizable graphics
characters on the screen. Therefore, **None**
is usually used *only* for examining parity
bits with the Hex Listing facility desribed in
Chapter 10.

**Odd**  The sum of all of the bits (including parity)
of the character transmitted is odd.

**Even**  The sum of all of the bits (including parity)
of the character transmitted is even.
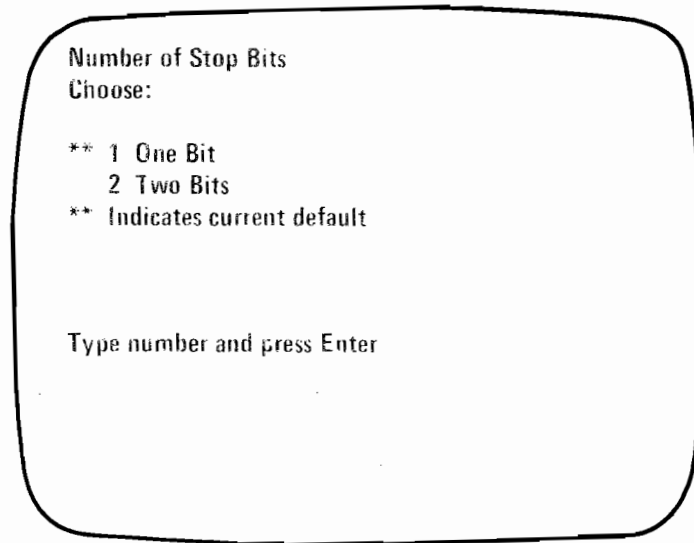
Mark    The parity bit is always set to 1.

Space    The parity bit is always set to 0.

# Number of Stop Bits

Stop bits are sent by your IBM Personal Computer after each character to keep the line in synchronization. These bits let the receiver detect the begining of the next transmitted character. Usually, only one stop bit is required.

The number of stop bits you select must match the number for the host system. If the host system uses two stop bits, enter the number 3 on the Terminal Feature Menu. The following menu appears:

```
Number of Stop Bits
Choose:

**  1  One Bit
    2  Two Bits
**  Indicates current default




Type number and press Enter
```

To select **Two Stop Bits**, type the number 2 and press the Enter ([←]) key. Pressing Enter ([←]) returns you to the Terminal Feature Menu.

Note:    If you are using a 110 bits per second line bit rate, you will always get two stop bits, no matter what you select on this menu.

# XON/XOFF Support

The XON/XOFF support is part of a full duplex protocol. It lets a computer (or terminal) signal another remote computer (or terminal) to stop transmitting data when the receive buffer in the Communications Program is in danger of overflowing, or to restart transmission when a safe amount of space is again present in this buffer.

The rules for this protocol are simple. When the IBM Personal Computer wants a remote machine to stop transmitting, it sends XOFF (Hex 13). When it wants the remote machine to start sending again, it sends XON (Hex 11). The IBM Personal Computer also follows these rules during data transmission. If it is transmitting and receives an XOFF from the remote machine, transmission of data stops until an XON is received.

The default value is **XON/XOFF Control Supported**. If you wish to change this parameter, enter the number 4 on the Terminal Feature Menu. The following menu is displayed:

```
XON/XOFF Support
Choose:

**  1  XON/XOFF Control Supported
    2  XON/XOFF Control Not Supported
**  Indicates current default



Type number and press Enter
```

# Line Turnaround Char Sent to Host

To tell the host computer that you have completed typing a line of text at the terminal, you press the Enter ([←]) key. The character produced by pressing Enter ([←]) is called the *line turnaround character* sent to the host.

The turnaround character indicates the end of a line of input sent to the host computer. The host computer takes action on that line and sends back a response.

The default value for this character is a Carriage Return. If you wish to change the value of the line turnaround character, enter the number 5 on the Terminal Feature Menu. The following menu is displayed:

```
Line Turnaround Char Sent to Host
Choose:

** 1 Carriage Return (HEX 0D)
   2 XON (HEX 11)
   3 XOFF (HEX 13)
   4 EOT – End of Transmission (HEX 04)
   5 Line Feed (HEX 0A)
   6 CR Without New Display Line
** Indicates current default



Type number and press Enter
```

**Notes:**

Notes 1 and 2 apply when you select local character echoing (see below).

1.  Items 1 through 5 in the above menu cause the cursor to be redisplayed on a new line at the time the turnaround character is sent to the host.

2.  Item 6 (CR Without New Display Line) keeps the cursor at the end of the current line. This item can be used to prevent the insertion of unnecessary blank lines on the screen for systems that transmit a Carriage Return plus Line Feed at the beginning of each new line transmitted.

3.  The XON and XOFF characters that are used as turnaround characters are being used simply as control characters to signal a specific event to the host computer (or to your IBM Personal Computer). This is not the same as the use of these characters in the XON/XOFF support described previously. Specifically, VM/370 and MVS/TSO do not use the XON/XOFF support previously described. They may, however, use the XON or XOFF control characters for their own control purposes.

# Local or Host Character Echoing

One commonly used full duplex protocol specifies that each character typed on a terminal keyboard and then transmitted will be echoed (sent back when it is received) by the host computer. The terminal then displays only the characters received from the communications line. This mode of operation is *host echoing of characters*.

If characters are not being echoed by the host, they are displayed on the terminal as they are typed. This mode of operation is *local echoing of characters*.

Host echoing of characters has the advantage that when you see a character displayed on your screen, you know it was received correctly by the host system. An additional advantage is that the host computer has full control over what is displayed on your local terminal. For example, the host computer could suppress the display of a logon password when it is entered.

A disadvantage to host echoing of characters becomes apparent when the host computer is located at such a distance from the terminal that the delays in transmission of characters become noticeable.

The default value is local echoing of characters (displayed as typed). If you wish to change this parameter, enter 6 on the Terminal Feature Menu. The following menu is displayed:

Local or Host Character Echoing
Choose:

** 1  Characters Displayed as Typed
    2  Chars Displayed when Echoed by Host
**  Indicates current default


Type number and press Enter

If the host system you are using echoes characters, enter 2 to select **Chars Displayed when Echoed by Host**.

If the host system you are using does not echo characters typed at the keyboard, then enter 1 to select **Characters Displayed as Typed**.

# First, Second, Third, and Fourth Characters to be Deleted

When you are in communication with a host computer, the host may transmit characters you do not want displayed on your screen. Generally, these are special ASCII characters known as *control characters*. One specific control character is always deleted if sent by the host — the Rubout character (Hex 7F). All other control characters are received and displayed, unless you specify that they are to be deleted.

Four items on the Terminal Feature Menu allow you to specify characters to be deleted:

<br>

      7     First Character to be Deleted

      8     Second Character to be Deleted

      9     Third Character to be Deleted

      10    Fourth Character to be Deleted

If you select any one of these items, you may choose a character to be deleted. A character to be deleted may be a specific single character (for example, the Line Feed character), or the list of all control characters that are not used by the Communications Program.

If you wish to specify a character (or characters) to be deleted, enter 7, 8, 9, or 10 on the Terminal Feature Menu. After each of these entries, the following menu is displayed:

```
First Character to be Deleted
Choose:

** 1  No Character Specified
   2  Carriage Return (HEX 0D)
   3  Line Feed (HEX 0A)
   4  Bell (HEX 07)
   5  XON (HEX 11)
   6  XOFF (HEX 13)
   7  Escape (HEX 1B)
   8  Tab (HEX 09)
   9  Backspace (HEX 08)
  10  All Unused Control Characters
** Indicates current default


Type number and press Enter
```

**Notes:**

1.  This menu is also displayed for the **Second, Third,** and **Fourth Character to be Deleted;** the first word on the screen changes for the appropriate menu.

2.  If a character is deleted, it is removed as it is received from the communications line, and it is not processed by the rest of the program. For example, if you select XON/XOFF Control Supported, *do not* delete XON or XOFF characters.

    The program will not delete the character specified as Line End Character Sent by Host.

3. If you wish to select the control characters that are not used by the Communications Program, enter **10**. The eight characters specifically listed in the menu (items 2 through 9) are not included in the list of characters in **10 All Unused Control Characters**. Refer to Appendix C for a complete list.

4. If you enter 1 for **No Character Specified**, no character is deleted for that Terminal Feature Menu item.

   For example, when specifying a terminal to operate with a VM/370 host system, you might wish to delete Rubouts, Linefeeds, and XOFF characters. It is unnecessary to delete Rubouts, because Rubouts are always automatically deleted. For the **First Character to be Deleted**, select **3 (Linefeed)**. For the **Second Character to be Deleted**, select **6 (XOFF)**. The **Third and Fourth Character to be Deleted** menu items would be left at the default setting of **No Character Specified**, because only two characters need be deleted.

5. In general, you can specify the Carriage Return character for both the line turnaround character sent to the host and the line end character sent by the host. If the system is initially run with no characters deleted, extraneous characters transmitted by the host system may be detected. The Hex Listing feature (discussed in Chapter 10) is particularly useful in determining the hexadecimal codes of characters that you may wish to delete.

6. In particular, if you get extra blank lines between lines on the screen, set **linefeed** as one of your deleted characters.

# Line End Character Sent by Host

The character selected from this menu specifies the end-of-line character sent from the host computer. This character indicates that a new line should be started on the screen.

Many host systems transmit both a Carriage Return and a Line Feed character at the end of each line. In general, one of these characters should be deleted (by using the **First, Second, Third and Fourth Characters to Be Deleted**, above), and the other should be specified as the **Line End Character Sent by Host**.

The default value is a Carriage Return. If you wish to change the value of the line end character sent by the host, enter 11 on the Terminal Feature Menu. The following menu is displayed:

```
Line End Character Sent by Host
Choose:

** 1  Carriage Return (HEX 0D)
   2  XON (HEX 11)
   3  XOFF (HEX 13)
   4  EOT – End of Transmission (HEX 04)
   5  Line Feed (HEX 0A)
** Indicates current default




Type number and press Enter
```

Type the number of the character you wish to use and press the Enter (⏎) key. (Pressing Enter (⏎) returns you to the Terminal Feature Menu.)

# Communications Adapter Address

The Communications Program permits use of either Asynchronous Communications Adapter 1 or 2.

The Communications Program defaults to run with Communications Adapter Card 1. If you have two cards installed on your User Specified Terminal and wish to set the system to use the second card, enter **12** on the Terminal Feature Menu. The following menu is displayed:

```
Communications Adapter Address
Choose:

** 1 Communications Adapter 1
   2 Communications Adapter 2
** Indicates current default




Type number and press Enter
```

Enter the number of the adapter you wish to use.

Notes:

1.    If you have a single Communications
      Adapter Card, you cannot specify
      Communications Adapter 2.

2.    If you have a Communications Adapter 1
      Card and a Communications Adapter 2
      Card, Card 1 is selected as the Primary
      Asynchronous Adapter, and Card 2 is
      selected as the Alternate Asynchronous
      Adapter. Refer to the instructions
      supplied with the adapter card for selecting
      the interface format and adapter address.

3.    If you wish to use the second card in your
      system with either Dow Jones Service or
      THE SOURCE, VM/370, MVS/TSO, or
      for IBM Personal Computer to IBM
      Personal Computer Communications, you
      should use the **Other Terminal
      Specification File** selection on the
      Terminal Selection menu. Then use
      DOWMOD, VMMOD, TSOMOD, or
      PCMOD terminal specification files
      provided on the system diskette, and
      select Adapter 2.

# Start Up Selected Terminal

Once you have defined all of your terminal features, you are ready to start up your terminal. Enter the number 13 on the Terminal Feature Menu. This tells your IBM Personal Computer that you are ready to start up as a terminal.

You see the following message on your screen:

```
Computer connection NOT established
You are starting up as a terminal
Check computer or modem connection
```
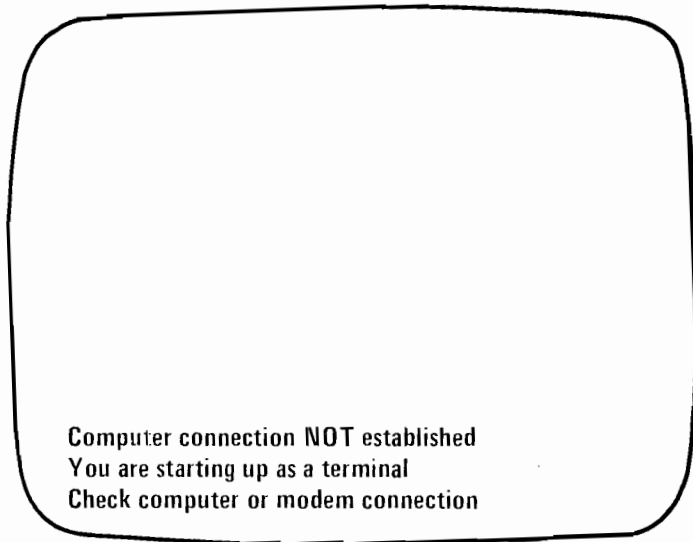
Note:    The first line of this message may not appear on your screen.

Now you make your phone connection. Follow the instructions in Chapter 2 under "Connecting to a Host Computer."

Then follow the logon procedure for your particular host system.

## Saving a Terminal Specification

After you have made all of your changes on the Terminal Feature Menu, you can save your new specifications in a file. To do so, enter 14 for **Save This Terminal Specification**.

The Communications Program asks you to enter the name of the file where you wish to save the specification. Enter any valid filename *except* PCMOD, VMMOD, TSOMOD or PCMOD.

If the filename you enter already exists, you are asked if you wish to overwrite the file or exit. If you choose to exit, you can try to save the file again with a different name.

From now on, whenever you want to use the specification you have saved, you enter *your* filename for the Other Terminal Specification File.

For example, on the Terminal Selection Menu, enter 6 for **Other Terminal Specification File**. Then when you are asked to enter the name of the file, enter the name you have saved your specification file in.

## Return to Terminal Selection Menu

If you wish to return to the Terminal Selection Menu (if you entered the wrong terminal type or want to run as another type of terminal), enter 15 on the Terminal Feature Menu. Refer to Chapter 2 for more information on the Terminal Selection Menu.

# CHAPTER 7. COMMUNICATING BETWEEN TWO IBM PERSONAL COMPUTERS

## Contents

# Establishing Communication

In most cases, if you wish to communicate with another IBM Personal Computer, you will be communicating over a telephone line, using a modem at each end. The following description assumes you are using modems. If you wish to connect two IBM Personal Computers directly with a cable, see the section, "Connecting by Direct Cable," in Appendix F.

To communicate between two IBM Personal Computers using modems, the operator of each computer must do the following:

1. Start up the IBM Personal Computer and load the Communications Program as described in "Loading the Communications Program" in Chapter 2.

   Your screen looks like this:

```
Terminal Selection Menu
Choose:

        1 Dow Jones Service or THE SOURCE
        2 VM/370 Terminal
        3 TSO Terminal
        4 User Specified Terminal
        5 Personal Computer Communications
        6 Other Terminal Specification File
        7 Disconnect Communications Line
        8 Exit Program



Type number and press Enter
```

2. Enter the number 5 to specify **Personal Computer Communications** on the Terminal Selection Menu.

   You see the following menu on your screen:

   ```
   Terminal Feature Menu
   Choose:

       1 Line Bit Rate [300]
       2 Start Up Selected Terminal
       3 Save This Terminal Specification
       4 Return to Terminal Selection Menu


   Type number and press Enter
   ```
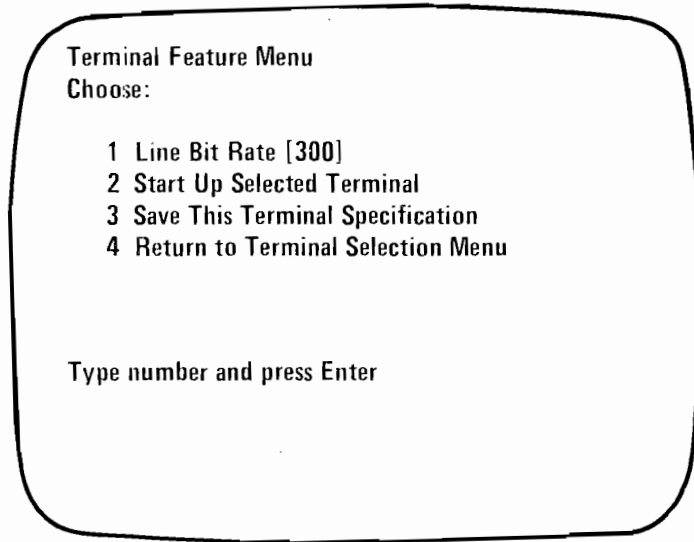
3. The only parameter you may need to modify is the line bit rate (the default setting is 300 bits/second). The bit rate should be the same for both IBM Personal Computers and should be set to the maximum that the communications line and modems will allow.

   If you need to change the line bit rate, enter 1 on the Terminal Feature Menu. The following menu is displayed:

```
Line Bit Rate (Bits/Sec)
Choose:

      1  75
      2  110
      3  150
**    4  300
      5  600
      6  1200
      7  1800
      8  2400
      9  4800
    10  9600
**  Indicates current default


Type number and press Enter
```

Type the number of the line bit rate you wish to use and press the Enter ([↵]) key. (Pressing Enter ([↵]) returns you to the Terminal Feature Menu).

4. Connect power to the modems and turn them on.

   The modems must be set up as described in Chapter 1.

5. The message **Computer connection NOT established** usually appears followed by the message **Check computer or modem connection**. See the section in Chapter 2, "Connecting to a Host Computer" for more details on these messages.

6. One operator must now call the other. For acoustic coupled modems, once both operators are connected on the telephone line, place your respective telephone receivers in the cups on the acoustic couplers.

7. On the Terminal Feature Menu, enter the number 2 to select **Start up Selected Terminal.**

   If the message **Line connected** appears on the bottom line of the screen, connection has been established between your IBM Personal Computers. If this message does not appear, connection may still have been made, and you should test to see if text typed on one IBM Personal Computer appears on the screen of the other.

Full duplex communications is now established. Anything typed on either IBM Personal Computer will appear on the screens of both computers. Pressing the Enter ($\boxed{\hookleftarrow}$) key starts a new line on both computer screens.

If both you and the other operator type at the same time, things could be a bit confusing, so the two of you should work out some simple communications protocol. If you use a backspace to correct an error in typing, it will delete the character on your screen, and will back up the cursor on the screen of the remote IBM Personal Computer. Therefore, text that you correct by backspacing and retyping will appear correctly on the screen of the remote IBM Personal Computer.

   **Notes:**

   1. If you are using a direct cable connection between two IBM Personal Computers, you must use a special cable that reverses the send and receive lines. (Refer to Appendix F for more information.)

   2. During startup of the computers, connection may be established even though the **Line connected** message does not appear.

# Other Specification File

If you select the item **Personal Computer Communications** in the Terminal Selection Menu, the only parameter you can modify is the line bit rate. The rest of the parameters are set as described in the section "Default Parameters" in Appendix C. Occasionally, you may need to change other parameters.

If you need to change some other parameters, when you get the Terminal Selection Menu on program startup, enter 6 to request **Other Terminal Specification File**.

The Communications Program asks you to enter the name of the file where the specification is stored. Enter the name **PCMOD**. (If you have stored your specifications in another file, see "Saving a Terminal Specification" later in this chapter.)

PCMOD is a file on the Communications Program diskette that contains the default parameters for communicating between two IBM Personal Computers.

> Note: The actual filename on the diskette is PCMOD.TER, but do not enter the .TER. The Communications Program adds .TER to the filename you enter.

PCMOD.TER is loaded, and you see the following Terminal Feature Menu, which shows all of the default values in brackets [ ]:

```
Terminal Feature Menu
Choose:

     1  Line Bit Rate [300]
     2  Type of Parity Checking [Even]
     3  Number of Stop Bits [One Bit]
     4  Line Turnaround Char Sent to Host [CR]
     5  First Character to be Deleted [None]
     6  Second Character to be Deleted [None]
     7  Third Character to be Deleted [None]
     8  Fourth Character to be Deleted [None]
     9  Line End Character Sent by Host [CR]
    10  Communications Adapter Address [1]
    11  Start Up Selected Terminal
    12  Save This Terminal Specification
    13  Return to Terminal Selection Menu


Type number and Press Enter
```

You can change any of the parameters on this screen, or you can start up the terminal as specified. For example, the default number of stop bits is **One Bit**. If you wish to specify another number of stop bits, enter **3**. Then enter the number you want when the next screen appears.

Refer to Chapter 6 for a complete description of the different parameters.

# Saving a Terminal Specification

After you have made all of your changes on the Terminal Feature Menu, you can save your new specifications in a file. To do so, enter **12** for Save **This Terminal Specification**.

The Communications Program asks you to enter the name of the file where you wish to save the specification. Enter any valid filename *except* PCMOD.

If the filename you enter already exists, you are asked if you wish to overwrite the file or exit. If you choose to exit, you can try to save the file again with a different name.

From now on, whenever you want to use the specification you have saved, you enter *your* filename for the Other Terminal Specification File.

For example, on the Terminal Selection Menu, enter 6 for **Other Terminal Specification File**. Then when you are asked to enter the name of the file, enter the name you have saved your specification file in.

# Transferring Files Between IBM Personal Computers

Files transferred between IBM Personal Computers must be ASCII text files and have no lines longer than 250 characters. Files that can be accessed by EDLIN or listed by the DOS TYPE command can be transferred (for example, a BASIC program saved as an ASCII file).

For other files, you must prepare the file for transfer by using the FILECONV program. See Chapter 9, "Conversion of ASCII and Binary Files" for instructions.

To transfer a file between two IBM Personal Computers, perform the following steps:

1. Establish communication between the computers as described in the section "Establishing Communication" earlier in this chapter.

2. Once communication is established, each operator should press the $\boxed{\text{F2}}$ key to see the following Function Selection Menu:

Function Selection Menu
Choose:

    1  Send File Data to Host
    2  Transmit a Personal Computer File
    3  Receive a Personal Computer File
    4  Return to Terminal Operation
    5  Return to BASIC
    6  Return to Terminal Selection Menu

Type number and press Enter

3. The operator who is sending the file now enters the number 2 to select **Transmit a Personal Computer File**. The operator who is to receive the file enters the number 3 to select the item **Receive a Personal Computer File**.

The order in which these actions are taken does not matter. No matter which of the functions (transmitting or receiving a file) is ready to go first, it synchronizes its operation with the other. In fact, your IBM Personal Computer can still be in terminal operation mode with the

other ready to send or receive. In this case, you
see an appropriate message (**Ready to send** or
**Ready to receive**) from the other IBM Personal
Computer.

> Note: If you wish to transfer files
> between an IBM Personal Computer and a
> non-IBM Personal Computer, use the
> general file transfer facility described in
> Chapter 8. See "Personal Computer File
> Transfer Protocol" in that chapter.

The actions of each of the IBM Personal Computers
are now described separately.

# Transmitting an IBM Personal Computer File

When you select the menu item **Transmit a
Personal Computer File**, you must perform the
following steps:

1.  You are asked for the name of the file you wish
    to transmit.

    Enter the filename in the following format:

    [*d*:] *filename.ext*

    where,

    **d:**        The drive. If you do not specify a
    drive, the DOS default drive is
    assumed.

    **filename**  Any 1-8 character alphanumeric
    name.

    **.ext**      A 1-3 character filename extension.

(Refer to your IBM Personal Computer *Disk Operating System (DOS)* manual for more information on filenames.) If you do not enter a drive specifier, the file is assumed to be on the default drive.

If the specified file does not exist, or if for some other reason the file cannot be accessed, an appropriate message is displayed. You can then specify another filename or return to the Function Selection Menu.

2.  If the file exists and can be accessed, the message **Ready to send [filename]** is sent to the remote IBM Personal Computer. Your IBM Personal Computer then waits for a message from the remote computer that indicates it is ready to receive a file. If you want to interrupt this waiting and return to terminal operation, press the [F1] key.

3.  When the **Ready to receive file** message from the remote IBM Personal Computer is displayed on the local computer, a message is sent back to the remote computer indicating that transmission is ready to begin. The file is then transmitted one line at a time. The number of the line currently being transmitted appears in the lower right-hand corner of the screen.

4.  When all of the lines in the file are transmitted, the message **Transmission completed** is displayed. A message indicating that the end of the file was reached is sent to the remote computer. Press Enter ([←]) to return to terminal operation.

**Notes:**

1.  You can stop the file transfer at any time by pressing the ⌈F1⌉ key. Transmission is also stopped if file errors are detected in reading the file. In either case, a message indicating that transmission has ended (together with the cause) is sent to the remote computer.

2.  The file transfer can also be stopped at the request of the receiving IBM Personal Computer. When this occurs, the message **Transmission ended at receiver's request** is displayed with a message describing the cause.

3.  If the number indicating the current file line being transferred stops changing, or if a **Line disconnected** message appears at the bottom of the screen, then you have been disconnected from the remote computer. At this point you can return to terminal operation after pressing the ⌈F1⌉ key. After reestablishing your connection with the remote IBM Personal Computer, make sure you can communicate as a terminal before attempting another file transfer.

# Receiving a File on Your IBM Personal Computer

When you select the menu item **Receive A Personal Computer File**, you must perform the following steps:

1.  You are asked for the name of the file where the transmitted file is to be saved. Enter the full name of the file (including any extension). (Remember, the filename format is [*d*:] *filename.ext*.) If you do not enter a drive specifier, the file is put on the default drive. If for some reason the file cannot be written, an appropriate error message is given. You may then specify another filename or return to the Function Selection Menu. If you enter the name of an existing file, you are asked if you want to leave it alone, append, or overwrite it.

2.  If the file can be written, the message **Ready to receive file** is displayed. This message is also transmitted to the remote IBM Personal Computer that will be sending the file. A control code is appended to this message, indicating that your local computer is ready to receive file lines.

3.  Wait for a message from the remote computer indicating that file lines are about to be transmitted. Periodically the message **Ready to receive file** and an associated code are sent to the remote computer. If you want to interrupt this waiting and return to terminal operation, press the [F1] key. (While you wait, any messages from the remote computer are displayed on your screen.)

When the remote computer is ready to send a file, the message **Starting file transmission** appears on your screen.

4.  The file is transmitted one line at a time. The number of the line currently being transmitted appears in the lower right-hand corner of the screen.

5.  When all of the lines of the file are transmitted, the message **Transmission completed** is displayed. You can then return to terminal operation by pressing the Enter ($\leftarrow$) key.

    **Notes:**

    1.  You can interrupt the file transfer at any time by pressing the F1 key. Pressing this key stops storing the received lines on your file and sends a message to the remote computer that stops the transmission of file lines. Problems with the writing of your local file (such as running out of space) can also stop the transfer operation. In that case, you see an appropriate message on your screen, and a message is transmitted to the remote computer to cause it to stop transmission.

    2.  If the number indicating the current file line being transferred stops changing or if a **Line disconnected** message appears at the bottom of the screen, you were probably disconnected from the remote computer. At this point you can return to terminal operation after pressing the F1 key. After reestablishing your connection with the remote IBM Personal Computer, make sure you can communicate as a terminal before attempting another file transfer.

# CHAPTER 8. GENERAL FILE TRANSFERS

## Contents

# How Do You Transfer a File?

You can transfer files between your IBM Personal Computer and a host or between two IBM Personal Computers in a number of ways. Chapters 4 and 5 describe how you can upload or download files when logged onto a VM/370 or MVS/TSO system. Chapter 7 describes how to transfer files between two IBM Personal Computers.

These methods for transferring files are simple and easy to use, and they provide clean transfers of files. However, they require that you have a specific system (such as VM/370, MVS/TSO, or another IBM Personal Computer) at the other end of the communications line.

This chapter describes two more general purpose file transfer functions that you can use to transfer files to and from a wide variety of host systems or non-IBM personal computers.

The File Writing function lets you save in a file any text sent to your IBM Personal Computer from a host. The File Sending function lets you transmit the contents of a file to most host systems.

# What You Must Do

First, establish communication between your IBM Personal Computer and the host computer (or another personal computer). Then begin the file transfer function.

Files may include program source files, documents, or any other ASCII text files with fixed or variable record lengths.

Program object files cannot be transferred unless converted into a text format (using, for example, the FILECONV program described in Chapter 9).

> Note: Be sure to read Chapter 8 before you try to transfer files. Also, you should be familiar with the operation of the host system you are using.

# Sending a Host File to the IBM Personal Computer

The File Writing function allows you to transmit data to a file on your IBM Personal Computer from a host system. Thus, you can move a file (or other information) from most host systems to a file on your IBM Personal Computer.

To send a file from your host system to a file on your IBM Personal Computer, perform the following steps:

1. Access your host computer as you normally would.

2. Press the (F8) key to start File Writing. The word **FILEWRITE** is now highlighted on the screen.

3. The program asks you to enter the filename. Enter the name of the file where you wish the host output to be placed. The filename format is [d:] *filename.ext* or LPT1. If the drive is omitted, the file is written on the default drive.

**Note:** If you specify **LPT1** as the name of the local file, the output received from the host is printed on the parallel printer, rather than being placed in a file. This printing differs from the session printing caused by pressing the $\boxed{\text{F7}}$ key in that *only* text received from the host system is printed (what you enter from the keyboard is not, unless you are connected to a host that echoes back the characters you type). In addition, the printing is buffered, so text does not immediately appear on the printer as each line appears on the screen.

If the file you specify already exists, you are given three choices:

**Exit**  Leave the existing file as it is

**Overwrite**  Write over the existing file with the new information

**Append**  Add the new information to the end of the existing file

4.  Enter the necessary commands to your host system so that it will list a file on your terminal.

5.  As the file is listed, everything that appears on the screen is listed on your file. This listing continues until you stop it. To stop File Writing, press the $\boxed{\text{F8}}$ key again. Then the file is closed, and the word FILEWRITE is no longer highlighted.

For example, suppose you wish to send a file from a host computer to your IBM Personal Computer. On the host system, the command **TYPE** *filename* lists that file at the terminal. To send this file, perform the following steps:

1.  Start up File Writing as described above.

2.  Enter the name of the local file (IBM Personal Computer file) where you want the data.

3.  Type **TYPE** *filename* and press the Enter ($\leftarrow$) key.

    As the data is displayed on the screen, it is also placed on the local file.

4.  When the host finishes listing the data, press the F8 key to stop File Writing.

    **Notes:**

    1.  If the host displays a message saying it has completed listing the file, that message will also be on the IBM Personal Computer file, and you may need to manually delete it from the file.

    2.  If you are operating on a system with *local* echoing of characters (such as VM/370), then what you type at the terminal is not saved on the IBM Personal Computer file.

If you are operating connected to a system where *host* echoing of characters is used (such as the Dow Jones Service), then what you type is saved on the IBM Personal Computer file.

3.  File writing of data generally keeps up with the data transmitted from the host computer at data rates of 1200 bps and lower. At 2400 bps, short files can be transmitted without loss of data (due to buffer overflow), but long files should be listed in pieces in order to give the system a chance to catch up. If File Writing is used with the print function on, the data rate at which the system can keep up is governed by the printer.

í.  File access errors automatically turn off File Writing, displaying a message to that effect.

ì.  File Writing cannot be left on when performing File Sending, Downloading from VM/370 or TSO, or IBM Personal Computer to IBM Personal Computer file receiving. If you select any of these options on the Function Selection Menu with File Writing on, File Writing is automatically turned off. If you return to the Terminal Selection Menu, File Writing is also turned off.

# Sending a File to a Host System

You can use the File Sending function to transfer data from a file on your IBM Personal Computer to a host system. The host system must have some way to accept data from an IBM Personal Computer and place it into a file. To do this, you start up an editor on the host system and place that editor into INPUT mode. All subsequent lines transmitted from the IBM Personal Computer are then placed into the host file by the editor.

The File Sending facility allows two methods for sending files:

- Using XON/XOFF control

- Using return characters

## Sending a File Using XON/XOFF Control

Your IBM Personal Computer can transmit data from your file continuously until the end of the file is reached. You generally use this facility with a host system that has XON/XOFF control. XON/XOFF control gives the host system the ability to turn off your transmission (by sending you an XOFF) if it is receiving too much data, and then to turn transmission back on (by sending an XON) when it is ready for data again.

To send a file in this way, perform the following steps:

1. Access the host system as a User Specified Terminal. Do the following:

   a. Turn on your computer and load the Communications Program.

   b. On the Terminal Selection Menu, enter 4 for **User Specified Terminal**.

   c. Select the terminal features for correct operation with your host system. XON/XOFF Support should remain set to the default [Present].

   d. On the Terminal Feature Menu, enter **12** for **Start Up Selected Terminal**.

   (See Chapter 6 for more details.)

2. Set up the host system so it is ready to receive lines of data from your IBM Personal Computer. To do this, access a host system editor and set the editor in a mode to receive lines of data.

3. Press the ⌐F2⌐ key to obtain the Function Selection Menu.

4. Enter the number 1 to select **Send File Data to Host**.

5. When the program asks for the filename, enter the name of the file you wish to send to the host. The filename format is [*d*:] *filename.ext*. If the drive is omitted, the file is assumed to be on the default drive.

If the file you specify does not exist, you receive a message to that effect. You can then specify another filename or return to the Function Selection Menu.

6. You are next asked if you wish to wait for return characters from the host after each line sent. Reply N (or NO).

7. File transmission now begins.

   Notes:

   1. All lines transmitted to the host and all replies from the host are displayed on your screen. This lets you see if anything goes wrong.

   2. To stop File Sending at any point, press the ⌐F1⌐ key. You can then return to terminal operation by pressing Enter ( ⌐↵⌐ ).

   3. When all of the file has been transmitted, you hear a beep, and you can then return to terminal operation and take any necessary action to save the file on the host computer.

## Sending a File Using Return Characters

The other method for sending a file is to specify one or more *return* characters, which your IBM Personal Computer must see in response to a line sent to the host system. Your IBM Personal Computer sends one line from the local file to the host and then waits for a response. When it sees the correct return character (or characters), it sends the next line. This continues until the entire file has been sent.

To send a file using return characters, perform the following steps:

1. Access your host computer as you normally would.

2. Set up the host system so that it is ready to receive lines of data from your Personal Computer.

3. Press the ⌜F2⌝ key to obtain the Function Selection Menu.

4. Enter the number 1 to select **Send File Data to Host**.

5. When the program asks for the filename, enter the name of the file you wish to send to the host. The filename format is [*d*:] *filename.ext*. If the drive is omitted, the file is assumed to be on the default drive.

   If the file you specify does not exist, you receive a message to that effect. You can then specify another filename or return to the Function Selection Menu.

6. You are then asked if you wish to wait for return characters from the host after each line sent. Such return characters tell the Communications Program that the host system is ready for another line of input. Answer Y (or **YES**).

7. You are then asked to list one (or more) return characters. You can specify any number of characters (up to a list of 80 typed characters), although you need to specify only one. You can specify the character by typing it directly or by specifying it as a two-character hexadecimal code. The hex codes permit you to specify special characters such as a Carriage Return.

Separate the characters or hex codes in the list by spaces and end the list of characters by pressing Enter ($\boxed{\leftarrow}$). The return character(s) should always be the last character (or set of characters) received from the host system when it acknowledges receipt of a line of input. (See "Determining the Return Characters" below for how to determine these characters.)

For example, suppose a host system indicates it is ready for another line of input by transmitting the symbol >. You could specify the return character by entering:

>

8.   Once the return character(s) are entered, the File Sending facility sends the first line of the file and waits for the return character(s). The lines sent (and those received in reply) are displayed on the screen. If only the first line of the file is displayed on the screen, you have probably specified the wrong return character(s).

9.   To stop File Sending at any point, press the $\boxed{\text{F1}}$ key. File Sending stops, and you are given a display of the last line of characters received from the host system. This display includes (in brackets) the hex codes of all characters.

10.  When all of the file has been transmitted, you hear a beep, and you can then return to terminal operation and take any necessary action to save the file on the host computer.

# Determining the Return Characters

The display of the characters received from the host is a good way of determining what return character(s) you need to specify. (See 7 above.) To obtain this list of characters, start up File Sending (as described above) and specify a dummy character of **80** as the return character.

Since this is an incorrect return character, File Sending stops after the first line is transmitted. At that point, press ⌐F1⌐. You are given a list of the return characters actually received. If you then restart File Sending using the last character (or last group of characters) in this list specified as the return character(s), File Sending should operate properly.

For example, suppose you wish to use File Sending to send the file AUTOEXEC.BAT to a host running on VM/370.

After logging onto VM/370, go into the CMS Editor, and place the Editor into INPUT mode. Then press ⌐F2⌐ to see the Function Selection Menu, and select **1 for Send File Data to Host**.

When you are asked for the name of the local file, specify **AUTOEXEC.BAT**. Reply Y when asked if you wish to use a return character.

Specify the character **80** as described above. The first line of the file lists on the screen as:

date

No further lines of the file appear, indicating that transmission has stopped, because you have not received the correct return character.

Press the ⎡F1⎤ key, and receive the following
message:

**Received characters (and their Hex codes):**
**<0D>.<2E> <11>**

The 11 is the hex code for an XON, which is the last
character transmitted by a VM/370 response.
Therefore, restart File Sending, and specify 11 as the
return character. The file now transmits correctly.

# Personal Computer File Transfer Protocol

The file transfer functions described above can be
used to transfer files between an IBM Personal
Computer and a non-IBM personal computer. The
non-IBM personal computer must be equipped with
some type of communications hardware, and
associated communications software that allows
files to be transmitted and input to be saved on a file.

To transmit a file from your IBM Personal
Computer to a non-IBM personal computer,
determine exactly how the non-IBM computer is set
up to receive input data and place it on a file. From
this information, you can select whether to transmit
with return characters or without. (See Appendix D
for information on terminal protocols.)

# Receiving a File Using Auto-Answer

The Asynchronous Communications Support
Program can be used with auto-answer modems to
allow the IBM Personal Computer to receive data
while unattended.

Connect the modem to the IBM Personal
Computer, and then start the Communications
Program. Select **Personal Computer
Communications** from the Terminal Selection
Menu, and then select **Start Up Selected Terminal**.
Press the ⌐F8⌐ key to select File Writing, and specify
the name of the file where any received information
will be stored.

Any IBM Personal Computer that has access to the
auto-answer telephone link can now use the **Send
File Data to Host** facility to communicate with this
IBM Personal Computer.

To exit from unattended mode, press the ⌐F8⌐ key.
File Writing is turned off, and the file is closed.

# CHAPTER 9. CONVERSION OF ASCII AND BINARY FILES

## Contents

FILECONV

# What Is the FILECONV Program?

FILECONV is a program that converts any IBM
Personal Computer DOS file into a format which
can be transmitted to another IBM Personal
Computer. FILECONV can then convert the file
back into its original form on the receiving
computer.

Only files that contain the printable ASCII
characters and certain control characters can be
transferred with the Communications Program.
Files which are not in this format, such as machine
language programs which typically have a file
extension of .EXE or .COM, cannot be transferred.
FILECONV produces a version of the file that
consists only of printable ASCII characters plus
code for error checking, which can then be
transferred. After the file is transferred, you can use
FILECONV to convert the file back into its binary
form on the computer that received the file.
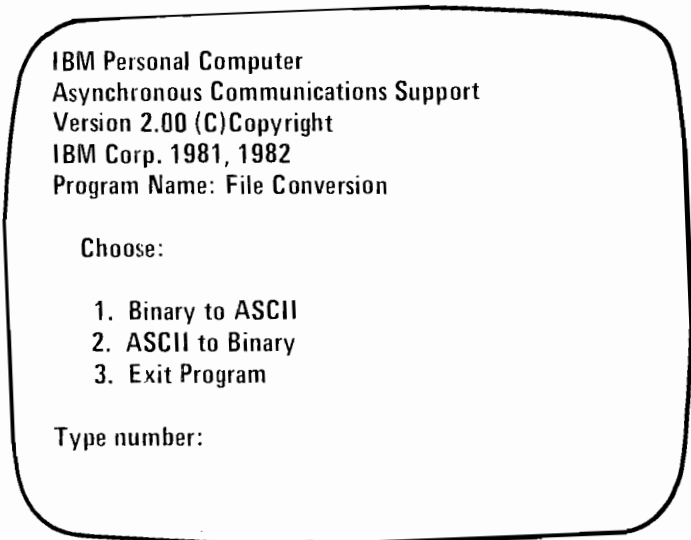
# How to Run FILECONV

To run FILECONV from the Communications
Program, enter the number **8** on the Terminal
Selection Menu to select **Exit Program**. This returns
you to the Disk Operating System (DOS), where
you see the > prompt.

Then enter the following:

FILECONV

You see the following menu:

```
IBM Personal Computer
Asynchronous Communications Support
Version 2.00 (C)Copyright
IBM Corp. 1981, 1982
Program Name: File Conversion

  Choose:

    1. Binary to ASCII
    2. ASCII to Binary
    3. Exit Program

Type number:
```

# Converting Binary Files to ASCII

If you wish to convert a binary file to ASCII format, enter 1 on the menu.

Then FILECONV asks you to **Enter binary filename.** This is the name of the file to be converted.

It then asks you to **Enter ASCII filename.** This is the name of a file where the converted version is to be saved.

FILECONV then reads the first file and writes a converted version of it in the second file, leaving the first file unchanged. You may then transmit the second file to the receiving computer.

In order to keep your filenames consistent in your directory, we recommend that you assign a filename extension of .ASC, or something similar, to the converted file.

For example, suppose you have a machine language program named MYPROG.EXE on drive B. You want to send it to a friend over a telephone line using the Asynchronous Communications Support Program. If the Asynchronous Communications Support Program is on drive A, perform the following steps:

1.  At the A> prompt, enter **FILECONV**.

2.  On the menu, enter 1 to convert the file MYPROG.EXE to ASCII format.

3.  Enter the filename **B:MYPROG.EXE** for the binary file.

4.  Enter the filename **B:MYPROG.ASC** for the ASCII file.

    The original program is converted to ASCII format and the new file is stored in MYPROG.ASC. You see the message **File conversion complete**. By pressing Enter (⏎), the menu is again displayed. You may elect to convert another file at this point, or enter **3** to exit the FILECONV program.

5.  FILECONV does not transmit any files, so at this point you must send MYPROG.ASC to your friend by using a file transfer function of the Asynchronous Communications Support Program.

    After the file MYPROG.ASC has been transmitted to your friend's computer, then your friend must run FILECONV on his computer to convert the file back to binary form (see the following page).

# Converting ASCII Files to Binary

If you wish to convert an ASCII file to binary format, enter **2** on the menu.

Then FILECONV asks you to **Enter ASCII filename**. This is the name of the file to be converted.

It then asks you to **Enter binary filename**. This is the name of a file where the converted version is to be saved.

FILECONV then reads the first file and writes a converted version of it in the second file, leaving the first file unchanged.

For example, suppose you received a converted version of a machine language program named MYPROG.ASC which is on the diskette in drive B. You want to change it back to its original binary format. If the Asynchronous Communications Support Program is on drive A, perform the following steps:

1.  At the A> prompt, enter **FILECONV**.

2.  On the menu, enter **2** to convert the file MYPROG.ASC to binary format.

3.  Enter the filename **B:MYPROG.ASC** for the ASCII file.

4.  Enter the filename **B:MYPROG.EXE** for the binary file.

    FILECONV converts MYPROG.ASC to binary format and places the converted version in MYPROG.EXE. The name and date of the original binary file are displayed, as well as the level number of the FILECONV program that was used to create the ASCII file. When the

file conversion is finished, you see the message **File conversion complete**. Pressing Enter ( $\boxed{\leftarrow}$ ) displays the menu again. You may elect to convert another file at this point, or enter **3** to exit the FILECONV program.

> Note: When transferring a file from some host computers to the IBM Personal Computer, certain extraneous messages sent by the host (such as **OK** or **READY**) may appear at the end of the file. You do not need to worry about these when recreating the binary file, because FILECONV ignores any extraneous messages that may occur either before or after the actual text of the file.

# FILECONV Error Messages

When you convert a file back into its binary form, FILECONV displays information about the original name of the file and the date when the file was last modified. It also indicates the level of FILECONV that was used.

If this header information is not part of the file, then FILECONV assumes that the file was not produced by the FILECONV program. It then displays the following message:

**Input file was not prepared by FILECONV**

If you enter exactly the same filename for both input and output, the following message is displayed:

**Cannot use *filename.ext* for both input and output**

FILECONV has some additional error checking information built into the format of the converted file, and this can be useful for detecting errors in the transmission of the file. However, you must be aware that not all errors can be caught by this means. Processing continues even if errors are detected.

FILECONV reports the line numbers of the ASCII file, if any, that were transmitted in error. The line numbers start with line 1, which contains the name and date of the original binary file.

> Warning: When sending a file from the IBM Personal Computer to a host, from the host to another host, and finally to an IBM Personal Computer, some file conversion between hosts may occur. To guard against the following types of conversions by a host editor, refer to your host system user's manual:
>
> - Lowercase characters converted to uppercase
>
> - Spaces converted to tabs

# CHAPTER 10. TROUBLESHOOTING PROBLEMS AND UNDERSTANDING ERROR MESSAGES

## Contents

SOLVE PROBLEMS

# Problems Getting Connected to a Host System

## Meaning of Line Connect and Disconnect Messages

Data Set Ready (DSR) and Clear to Send (CTS) are input signals on wires in the cable connecting to the Asynchronous Communications Adapter. They come from the computer (in a cable connected system) or from the modem (in a remote connected system). These signals indicate the presence or absence of a connection to the computer. DSR and CTS are monitored by the terminal program, and when either status changes, one of the following messages is displayed on the bottom line of the screen:

| Message | Meaning |
| --- | --- |
| Line disconnected | Either the DSR or CTS signal, or both, were turned off. |
| Line connected | Both the DSR and CTS signals have been turned ON (from a state where one or both of them were OFF). |
| Line disconnect/reconnect | From a state where both the DSR and CTS signals were ON, one or both of them were turned OFF and then ON again. |

SOLVE PROBLEMS

# Meaning of "Computer connection NOT established" Message

When starting up as a terminal, you may see the message **Computer connection NOT established**. This message is given if the DSR and/or the CTS signals are OFF at startup time. It indicates that for some reason the connection to a host computer has not been established. If the DSR and CTS signals go ON subsequent to startup, you see the message **Line connected** described above.

If the **Computer connection NOT established** message does not appear, this does not necessarily mean that you have established connection to the host computer. If the DSR or CTS signal line in the cable connecting to the Asynchronous Communications Adapter is floating (not connected to any signal source), or if the cable is disconnected, these signals can be either **ON** or **OFF**. In any case where you fail to communicate with your host system, check your cable connections.

# Troubleshooting a Cable Connected System

When an IBM Personal Computer is cable connected to a host computer, the DSR and CTS signals may be off when the IBM Personal Computer starts up as a terminal for the first time. In that case, the message **Computer connection NOT established** appears. You may need to wait (up to 30 seconds) until the host computer recognizes the presence of the IBM Personal Computer and activates the DSR signal.

If the **Line connected** message (indicating the presence of the DSR and CTS signals) fails to appear in that time, check the connections between your IBM Personal Computer and the host computer, and the status of the host computer.

# Troubleshooting a Modem
# Connected System

In a system connected through a modem, the DSR
and CTS signals may be OFF until a computer
ON. In this case, if you start up as a terminal prior to
computer connection, you receive the message
**Computer connection NOT established**. Then
when you establish the connection to the host
computer, you see the message **Line connected**.

Some modems turn on the DSR and CTS signals as
soon as they are powered on, before computer
connection is established. When using such a
modem, you do not see either of these messages.

After connection to a host has been established you
may still need to wait a few seconds before a message
appears from the remote computer, indicating that
it is ready for input.

Modems usually have indicator lights that show
when connection to the host has been established. If
you have troubles in using a modem to connect to a
host system, read the manual for the modem you are
using to understand what these indicator lights
mean.

If a modem indicates that it has turned the DSR and
CTS signals ON and the IBM Personal Computer
fails to talk to the host system, check the cables
connecting your IBM Personal Computer to the
modem. (See "Connecting to a Host Computer" in
Chapter 2).

SOLVE PROBLEMS

# Dropped Telephone Lines

If you are using an acoustic (or direct-wired) coupler on a telephone line, the line quality may be poor and may prevent good access to the computer. If this condition exists, the connection "drops" shortly after you dial up the computer and establish the connection. If the modem has a Ready light, the light goes out when the connection drops. This is usually not a problem caused by the IBM Personal Computer. If it occurs frequently, make arrangements for a higher quality communications link.

Some host systems drop the telephone connection if you do not immediately give a logon command, or if you cannot come up with a valid password after several tries. For such systems, you must always be running as a terminal before you attempt to dial up the system.

# Meaning of Double Characters on Your Screen

If you do establish communications with the remote computer and see two characters on the screen for each character you type, check the Full Duplex/Half Duplex switch on the modem. It must be set to Full Duplex.

On some systems, the host computer echoes back every character that it receives from a terminal. See the section "Local or Host Character Echoing" in Chapter 6 for how to set a terminal specification to handle this situation. The modem should always be set to Full Duplex, no matter what type of character echoing you specify.

# Meaning of "Single CR missing at beginning" Message

When performing an Upload or Download with VM/370, the Editor normally responds with a Carriage Return prior to any other response. You see the **Single CR missing at beginning** message whenever that Carriage Return does not occur. This message is likely to appear in two instances.

First, you have not entered the CMS command level in VM/370. In order to perform uploading or downloading, you should be at a point where pressing Enter ($\leftarrow$) produces the response **CMS**. If the response you get is **CP**, enter CMS with the command **I CMS**.

Second, you are operating with a system that is echoing back characters transmitted over the communications line. When operating as a terminal, such echoed characters are discarded. However, echoed characters will prevent operation of Upload or Download. Characters can be echoed back from different places in the link between you and the host computer. For example, if you have a modem that has a Half Duplex/Full Duplex switch, setting that switch to Half Duplex will cause characters to echo. You can determine if characters are echoing by performing the following test:

1. Enter the VM/370 Editor, specifying a temporary filename. Go into input mode in the Editor.

2. Select the Function Selection Menu by pressing $\boxed{\text{F2}}$.

3. Select the item **Send File Data to Host** on that menu.

4. Specify the name of a short text file that you have on your diskette.

5. Specify that you want a return character, and specify the return character as hex 11.

6. The file will be sent line-by-line to VM/370. As it is sent, it will list on your screen. If two copies of each line appear on the screen, the connection to your host computer is echoing characters.

7. In order to use Upload or Download, you must change the connection so that it does not echo characters. If you are unable to make such a change, use the general file transfer facility for transferring files (see Chapter 8).

# I/O Signals Used by the Communications Program

The pin numbers and signals referenced below are those of the Asynchronous Communications Adapter connector at the back of your IBM Personal Computer.

The following lines are used for *output* data and control signals from the IBM Personal Computer:

- **Transmit Data (Pin 2):** The data transmitted by the IBM Personal Computer is sent on this line.

- **Request to Sent (RTS) (Pin 4) and Data Terminal Ready (DTR) (Pin 20):** When the Communications Program is loaded, these lines are left as previously set. They are both turned ON when you start up as a terminal at the time the message **You are starting up as a terminal** appears. If you load another BASIC

program after running the Communications Program or return to DOS, these lines remain ON unless they are turned off by another program.

- RTS and DTR are turned OFF on the communications line you were previously using when you select the **Disconnect Communications Line** menu item on the Terminal Selection Menu. RTS and DTR are also reset (turned OFF) whenever you'turn power to your IBM'Personal Computer off and then on.

- RTS and DTR are checked by some host systems to determine if a terminal is still connected. By leaving these lines ON and not exiting the Communications Program from the Terminal Selection Menu, you can run other programs on your IBM Personal Computer (either under BASIC or DOS) and then reload the Communications Program and return to a host connection without being disconnected by the host system.

The following lines are used for *input* data and control signals by the Communications Program:

- **Receive Data (Pin 3):** The data received by the IBM Personal Computer is taken from this line.

- **Clear to Send (CTS) (Pin 5):** This signal must be ON (together with DSR) in order for characters to be transmitted or received by the Communications Program.

- **Data Set Ready (DSR) (Pin 6):** This signal indicates that the connection to the host computer or modem has been established. See below for a discussion of how this signal controls transmission and reception of data.

The other input control signals that are sensed by the Asynchronous Communications Adapter are the **Ring Indicator (Pin 22)** and **Data Carrier Detect (Pin 8)**. These signals are not used by the Communications Program.

For characters to be transmitted on the communications line by the Communications Program, the **Clear to Send** and the **Data Set Ready** signals must be ON. If either of these signals is OFF, characters typed on the keyboard during terminal operation are stacked in a transmit buffer until both of these signals are ON. If sufficient characters are typed with one of these signals OFF, the transmit buffer overflows.

For characters to be received by the Communications Program and placed in the receive buffer, the **Clear to Send** and the **Data Set Ready** signals must both be ON. If either of these signals is OFF, received characters are ignored and lost.

# Providing Control Signals for Program Operation

From the description in the previous section, you can see that for transmission and reception of data by the Communications Program, the **Clear to Send** and **Data Set Ready** lines must both be ON. An ON condition requires that the line in question be held at greater than +3 volts. If either of these lines is left floating (unconnected), its state is indeterminate (either ON or OFF). Thus, the cable connection used must guarantee that Pins 5 and 6 are turned either ON or OFF by a connection to a voltage that goes above +3 volts (ON) or below −3 volts (OFF).

A typical acoustic coupler handles control of these lines by tying them together and turning them OFF when no connection to a remote computer is present and turning them ON when that connection is established.

For a direct cable connection to a host computer, these lines may also be tied together and turned ON and OFF to indicate whether the host system is ready or not ready.

Another way to wire a direct cable is with the **Request to Send line (Pin 4)** connected to the **Clear to Send line (Pin 5)**. With this connection, when your IBM Personal Computer turns ON the **Request to Send line**, it automatically turns on its **Clear to Send** input line.

If you have problems using the Communications Program which you suspect may be due to erroneous signals on the control lines, check with someone knowledgeable about the signals produced by the modem you are using or the cable connection to your host computer.

# What the Disconnect Communications Line Menu Item Does

When selected, the Disconnect Communications Line menu item first checks to make sure that you have already started up as a terminal. If you have not, it issues the message **Terminal connection never established** and takes no further action.

If you have started up as a terminal, it turns OFF the DTR and RTS lines on the Communications Adapter that was last used for communications. (If you have two Communications Adapters installed in your IBM Personal Computer, no lines on the other Adapter are changed.) The DSR and CTS lines are then tested. If both of these lines are ON, the message **Disconnect failed** is given. If either of these lines is OFF (indicating some kind of a disconnect), then the message **Disconnect successful** is given.

# How to Use the Hex Listing

The Hex Listing facility in the Communications Program lets you see non-displayable characters, such as Carriage Returns.

You can use the Hex Listing with any of the terminals in the Terminal Selection Menu. However, if you wish to look at all of the characters being received from the host over the communications line, you should use the following procedure:

1.  Select **User Specified Terminal** on the Terminal Selection Menu.

2.  Leave all of the **Character to be Deleted** selections set at **None**. (If you have a character set to be deleted, it will be removed before the Communications Program can display it in hex.)

3.  Leave **Line End Character Sent by Host** set to **Carriage Return**.

4.  Set **XON/XOFF Support** to **Absent**.

5.  Set the other menu items to match the host
    system you are using.

6.  Access a host system.

7.  When you are ready to inspect the characters
    coming from that system, press the [F6] key to
    turn ON Hex Listing. From that point until you
    turn OFF Hex Listing, all of the characters
    received from the host will be displayed.

    **Notes:**

    1.  Graphic characters are displayed in their
        normal form, not in hex.

    2.  Control characters are displayed as their
        hexadecimal codes inside of brackets. For
        example, a Carriage Return character
        displays as <0D>. However, the
        functioning of control characters is
        inhibited. Thus, a Carriage Return
        character would not cause a new line to
        start on the display.

    3.  When you enter characters at the terminal,
        the operation of the terminal and what is
        sent by the host appear exactly as when the
        Hex Listing is turned OFF.

For example, suppose you set up a terminal as
described above and log onto a VM/370 system.
After turning ON Hex Listing, you press Enter
(◄┘). You see the standard CMS VM/370 response.
However, with Hex Listing ON, it looks like this:

<0D> <0A> <13> CMS <0D> <0A> . <11>

The 0D hex codes are for Carriage Returns. The 0A
hex codes are for Line Feeds. The 13 hex code is an
XOFF. The period character is the VM/370 prompt,
and the 11 is the XON character that ends every
VM/370 transmission.

## Hex Listing When Parity Is None

A special mode of Hex Listing has been included for when the Parity menu item **None** is selected. In this case, the 8-bit bytes received from the communications line are transmitted directly to the Communications Program. The parity bits are thus intact and can be examined.

When Parity is **None**, the hexadecimal listing of each character received is always given. For the graphic characters, the parity bits are stripped off and the resulting *graphic character* is displayed, followed immediately by the hex code (in brackets) for that character. Control characters are still displayed only as hex codes.

For example, if a VM/370 system that outputs data with mark parity is accessed, the beginning of the CMS message appears as follows:

<8D> <8A> <93> C <C3> M <CD> S <D3> <8D> etc.

The **8D** is a **D** (Carriage Return) with the parity bit set to 1. The **C3** following the C is a 43 (the ASCII code for a C) again with the parity bit set to 1.


# How Messages Are Displayed

The Communications Program displays a large number of information and error messages to assist you in specifying a terminal and running your IBM Personal Computer as a terminal. The error messages and their meanings are given in Appendix A. The rest of this chapter describes the different types of messages and when they appear.

# Turning ON/OFF the Display of Receive Errors

As characters are received from the communications line, a check is made to determine if parity, framing, or overrun errors have occurred. In addition, a check is made to determine if a BREAK signal was received from the host system.

You have the option of having a dynamic message displayed each time one of these errors is detected, or suppressing these messages. The ON/OFF Receive Error key ([F4]) controls this function. Its operation is described in Chapter 2 in the section "Using Function Keys When Running as a Terminal."

The display of these messages is normally turned OFF when terminal operation is started. Thus, you do *not* see parity errors that may occur when connecting to a modem.

When you turn ON the display of Receive Errors, you see only the errors that occur *after* the function is turned ON. Once you establish communication with a host system, you may wish to turn ON this function so that detected errors are displayed.

If you appear to be getting parity errors on every character received, you should check to see what type of parity checking the host system is using. In some cases, you may not be able to avoid parity error checks. In these cases, to determine what the problem is, run with Parity equal to None (see "Hex Listing When Parity Is None" earlier in this chapter).

SOLVE PROBLEMS

# Dynamic Messages, at the Bottom of the Screen

Dynamic messages occur when your IBM Personal Computer is operating as a terminal or is transferring files. These messages appear on the bottom line of the screen. If the bottom screen line is empty when a message is generated, the message is displayed, and you hear a beep. If the bottom line of the screen is filled with a message, a new message just generated is *stacked* on a list, you hear a beep, and a blinking asterisk (*) is displayed to the left of the bottom screen line. Up to nine messages are stacked. If the same message occurs repetitively, only one copy of it is stacked.

To erase the current message and display the next one on the list (the earliest message stacked on the list is always the next one displayed), press the [F3] key. The next message is then displayed. The blinking asterisk (*) continues to appear to the left of the message line until the last message on the list is displayed.

If you are familiar with *stacks* used by computers, the messages are placed in a FIFO (First In First Out) stack. Displaying the messages (or stacking them on the list) does not interrupt the operation of the IBM Personal Computer when running as a terminal or during file transfers.

The Line connected and Line disconnected messages described in the section "Problems Getting Connected to a Host System" earlier in this chapter are always placed on the bottom line of the screen immediately. Similarly, the messages **Buffer close to overflow** and **Buffer has overflowed** are placed on the bottom line of the screen. If there are additional messages stacked up and not displayed when a message is written to the bottom line, the stack messages are not disturbed.

If the Communications Program is waiting for you to answer a query (for example, the name of a file for file transfer), then new messages are not displayed, and the F3 key does not function.

## Static Messages

Other instructional or error messages may appear while you are specifying a terminal or during uploading and downloading of files. These messages are displayed above the bottom line of the screen and are generally self-explanatory. Often operation of the computer is halted until you specify what action should be taken next. You are told what options you have at any such time.

If an error occurs during a file access, the message you get is generally the same as the one you would receive if a BASIC program were to terminate due to that error. Appendix A of this manual explains these errors. In some situations, you may see a message:

BASIC ERROR nn

where **nn** is some number. To determine the cause of such an error, look up the number given in Appendix A of the *BASIC* manual.

# Messages During Upload, Download, and Compare

Upload, Download, and Compare use the TSO and VM/370 Editors to access files on their respective systems to perform the file transfer functions requested. Using this process, the text messages produced by these Editors (which normally would be displayed at a user terminal) are checked to make sure the requested function is proceeding correctly. In general, if the expected message is not correct, operation is ended, and an error message is displayed followed by the text received from the host system.

For example, if you are attempting to download a file from VM/370 and specify SYSFILE (a filename without a filetype) for the host file, the Download program returns with the message:

**Error in host access**
**INCOMPLETE FILEID SPECIFIED**

The second line of this message comes directly from VM/370 and indicates the problem.

# APPENDIXES

## Contents

# APPENDIX A. MESSAGES

## Attention (Break) sent

When you are operating as a terminal, pressing the
[F1] key sends a BREAK signal to the host computer,
and this message is displayed on your screen.

## BASIC Error #nn

A BASIC error not normally encountered by the
Communications Program has occurred. Check this
error in Appendix A of your IBM Personal Computer
*BASIC* manual.

## Break signal received

A communications line BREAK signal was received
from the host computer (or another IBM Personal
Computer). This signal often occurs when a modem
is connected or disconnected from the telephone
line. In those situations, the message can be
ignored. The BREAK signal might also be used by
the host computer prior to sending a warning
message to system users. The Communications
Program takes no action when a BREAK signal is
received other than to display this message.

## Buffer close to overflow

The receive buffer is getting close to the point where
it will become filled with data from the
communications line and will overflow. This
problem indicates that the Communications
Program cannot keep up with the rate of data input.

You can usually avoid loss of data in this situation by interrupting the output from your host system (for example, by pressing the F1 key if using VM/370), and waiting for the data in the buffer to be displayed. You may need to wait for several seconds while the data in the buffer empties before you see the acknowledgement from the host computer that your BREAK was received. This delay is due to the fact that the receive buffer contains 2000 characters when it overflows, and these characters are all subsequently displayed on the screen.

You can then continue to list your file. For example, if using VM/370, pressing the Enter ( ⏎ ) key will continue the listing.

### Buffer has overflowed

The receive buffer filled with characters from the communications line and overflowed. Some characters were probably lost. When such an overflow occurs, characters that do not fit in the buffer are discarded.

You can usually avoid loss of data due to overflow by stopping transmission of data when the buffer is close to overflow (see **Buffer close to overflow** message above).

### Cannot exit with file open. Use System Reset

You cannot exit from the Communications Program because a file has not been closed. Use the System Reset ( Ctrl - Alt - Del ) to restart the program.

### Cannot find file *filename*

This message is displayed by FILECONV when the input file does not exist. You probably mistyped the filename or extension, or forgot to type a non-default drive.

### Cannot read from file *filename*

If FILECONV cannot read the input file (after having successfully opened it), then some disk error has occurred.

### Cannot use *filename.ext* for both input and output

While using FILECONV, you entered exactly the same filename for the ASCII file and the binary file. Use different names.

### Cannot write to *filename*

If this message occurs when you first specify the output file, then FILECONV cannot open the output file. You probably typed an invalid filename or requested a diskette drive with no diskette in it. If this message occurs during operation of the program, then you have had a file writing error, or the diskette is full.

### Check computer or modem connection

This is a reminder that you must make a connection to a computer using a local cable or modem before you can start operating as a terminal. If your connection is established at this time, ignore this message.

## Communications adapter not present

The Asynchronous Communications Adapter you requested is not present in your IBM Personal Computer. If you requested Communications Adapter 1, then no adapter is installed in your IBM Personal Computer. In order to request Communications Adapter 2, you must have two Communications Adapters installed in your IBM Personal Computer; Adapter Card 1 as the Primary Adapter and Adapter Card 2 as the Alternate Adapter.

## Comparison ended abnormally

The Compare function ended before all of the lines in the host system file were compared with the local file. An associated message gives the reason.

## Comparison failed at local line ## host line ##

The specified lines failed to compare. Comparison stops at this point. The lines in question are listed following this message.

## Comparison failed
## Lines remaining in host file

The end of the local file was reached while lines were still left to be compared in the host file. All of the lines that were compared up to that point compared successfully.

## Comparison failed
## Lines remaining in local file

The end of the host file was reached while lines were still left in the local file. All of the lines that were compared up to that point compared successfully.

### Computer connection NOT established

In starting up for operation as a terminal, either the Clear to Send or the Data Set Ready line was turned OFF. If one or both of these lines is OFF, it indicates you are not connected to your host computer. See Chapter 10 for a discussion of problems in connecting to a host computer.

### Could not access host data set
*Message*

In attempting to upload a file using TSO, the TSO editor could not be properly invoked for input of data. The *message* that follows is generated by TSO.

### Device I/O error

An error occurred on a device I/O operation. DOS cannot recover from the error.

### Disk full

All diskette storage space is in use. Erase files from the diskette, or use a new, formatted diskette. Do not attempt to write any additional files on the diskette until you have erased a sufficient number of files to give you the space for the data you are writing.

If you receive this message in conjunction with the **File close failed** message, see that message for a description of how to recover.

### Disk media error

The controller attachment card detected a hardware
or media fault. Usually this means the diskette has
gone bad. Copy any existing files to a new diskette
and reformat the bad diskette. If the formatting
fails, discard the diskette and format a new diskette.

### Disk not ready

The diskette drive door is open, or a diskette is not
in the drive. Place the correct diskette in the drive
and continue the program.

### Disk write protected

You tried to write to a diskette that is write
protected.

### Do not run using BASICA. Load BASIC

You tried to run the Communications Program after
loading Advanced BASIC (BASICA). Due to
memory limitation in a 64K IBM Personal
Computer, the Communications Program only runs
with Disk BASIC. Return to DOS and restart the
program by entering AUTOEXEC.

### Download ended abnormally

Downloading of a file ended before all of the lines in
the host system file were moved to the local file. An
associated message gives the cause for ending
abnormally.

## End of file

An input statement was executed either for a null (empty) file, or after all the data in a sequential file was already input. This error also occurs if you try to read from a file that was opened for output or append.

## Enter one (or more) return characters (separated by spaces)

Separate the characters by spaces. Use two adjacent characters to specify Hex codes (for example, 0D for Carriage Return). Refer to "Sending a File Using Return Characters" in Chapter 8.

## Enter screen width (40 or 80) [80]

Reply to this message with either **40** or **80**. This number specifies the number of characters per line that will be displayed on your screen. Enter a width of 80 unless your screen will not display 80 characters per line legibly. Just pressing the Enter (⏎) key gives you an 80 character screen.

## Error in host access
*Message*

The VM/370 EDIT editor was not properly invoked by the Upload, Download, or Compare function. The *message* that follows is issued by VM/370. If the *message* contains several lines of meaningless text, check to make sure that you are not invoking the XEDIT editor. See the section "Transferring Files with VM/370" in Chapter 4 for more details.

### Error writing file

An error occurred while you were writing a local file. Probably not all of the file was written. If you receive this message when transmitting a file to a remote IBM Personal Computer, this indicates that not all of the file you are transmitting has been correctly received.

### Failed to exit host editor
*Message*

In ending an upload to VM/370, a proper exit from the editor to CMS did not occur. Or, in ending a file transfer to TSO, a problem occurred in exiting from the TSO Editor. Return to terminal mode and make sure that you have exited from the Editor. The *message* that follows is issued by the host.

### File already open

You tried to open a file that is already open. This is probably due to the fact that you failed to close a file. See **File close failed** message below.

### File close failed

When you finish writing a file using the Communications Program, the file must be closed before other files can be written. The message following **File close failed** gives you more information as to the cause of the failure. In most cases, when you get this message, you have probably removed a diskette too soon. You should put the diskette you have most recently been using back in the same drive you removed it from, and then reply **Y** to the question **Retry file close (Y or N)?**.

If you get a **File close failed** message in conjunction with a **Disk full** message, retry the file close.

If you do not succeed in closing the file, some of the data at the end of the file will probably be lost. You will also not be able to write any more files or return to DOS using the **Exit Program** item in the Terminal Selection Menu. In this situation, you must perform a System Reset, and reload the Communications Program in order to be able to write files.

### File conversion failed

FILECONV did not successfully convert your file. An associated message gives the reason.

### File not found

The file you tried to read does not exist on the default (or specified) drive. Check to make sure you are accessing the correct diskette drive.

### File sending complete

When using the File Sending facility, all of the local diskette file has been transmitted to the host system. Return to terminal operation on the host system and take whatever action is necessary to save the transmitted file.

### File sending ended abnormally

File sending to a host computer or to another IBM Personal Computer stopped before all of the file was transmitted.

APPENDIXES

### Framing error

The Asynchronous Communications Adapter has detected a framing error in a received character. Such an error indicates that the transitions between voltages that designate the separate bits in a character are not occurring at the proper times. If this error occurs repeatedly, you may be operating at the wrong line bit rate. This error sometimes occurs when you are getting noise on the line when you are connecting a modem. In this case it can be ignored.

### F2 operates only in SEND state
### Use F1 to interrupt VM/370 or F5 to force to SEND state.

From VM/370, the Function Selection Menu can be accessed only when in SEND state. This prevents you from attempting actions, such as file transfers, when you are still receiving data from the host. You can, however, force the program to SEND state by pressing the ⌗F1⌗ or ⌗F5⌗ key.

### Host data set already exists

You tried to upload to an existing TSO data set. Either specify another data set name or return to terminal mode and erase the data set before trying to upload.

### Host error in upload
*Message*

During uploading of a file, the host system sent a return message after transmission of a line. The message sent by the host should follow.

## Host file accessed

In Download or Compare, the file you specified on the host has been found, and downloading or comparing is ready to begin.

## Host file not present

In trying to download using VM/370, you entered a filename that does not exist.

## Improper line count at line nnnn

This message may be displayed by the FILECONV program if there are errors in the transmission of the ASCII file. The transmitted lines are numbered sequentially, and if a line is lost in transmission, a line number out of sequence is found. This message probably indicates that the file is missing a line.

The line number in this message refers to the line number in the ASCII file, with the header line counted as line 1. This is not the same as the record number of the original binary file. (This line number may not be exact.)

You should either try to retransmit the file, or check the original line that caused the error.

## Initialization failed

You probably do not have your system diskette in the default drive. Insert the system diskette in the default drive and enter RUN.

### Incomplete CRC sequence at line nnnn

This message may be displayed by the FILECONV program if there are errors in the transmission of the ASCII file. A sequence of redundancy check numbers is placed at the end of each line transmitted. This message indicates that the sequence of numbers contains an error, such as a dropped character.

The line number in this message refers to the line number in the ASCII file, with the header line counted as line 1. This is not the same as the record number of the original binary file. (This line number may not be exact.)

You should either try to retransmit the file, or check the original line that caused the error.

### Incorrect CRC sequence at line nnnn

This message may be displayed by the FILECONV program if there are errors in the transmission of the ASCII file. This message probably indicates that you had an erroneous character in the line that was transmitted.

The line number in this message refers to the line number in the ASCII file, with the header line counted as line 1. This is not the same as the record number of the original binary file. (This line number may not be exact.)

You should either try to retransmit the file, or check the original line that caused the error.

### Input data segmented

With File Writing turned ON, a line length greater than 250 charactes was received. The first 250 characters were placed in a record, followed by a Carriage Return. Subsequent characters were written in a new record.

### Input file was not prepared by FILECONV

The header information added to the beginning of a file produced by FILECONV is missing. The file probably was not produced by FILECONV.

### Invalid character in input file: "c"

This message may be displayed by the FILECONV program if there are errors in the transmission of the ASCII file. The FILECONV program uses a standard set of ASCII characters. This message indicates that a character not in the standard set was found, probably because something was converted to the wrong character.

The line number in this message refers to the line number in the ASCII file, with the header line counted as line 1. This is not the same as the record number of the original binary file. (This line number may not be exact.)

You should either try to retransmit the file, or check the original line that caused the error.

### Invalid filename

You specified a filename that is too long, or you specified an invalid device in a file specification. See the IBM Personal Computer *Disk Operating System (DOS)* manual for a discussion of filenames.

## INVALID MODE 'LRECL'

This message is issued by VM/370. In a file transfer to VM/370, you failed to specify a VM/370 filetype.

### Invalid option

An invalid terminal option has been reached. You may have used a modified or damaged terminal specification file. Restart the program and use a valid terminal specification.

### Last return character invalid

You made an error in specifying the return character(s) for File Sending. The last character group prior to this message contains the character in error.

### Line connected

The connection to a modem or host computer was established. See Chapter 10 for more details.

### Line disconnected

The connection to a modem or host computer was broken. See Chapter 10 for more details.

### Line disconnect/reconnect

The connection to a modem or host computer was momentarily broken and then reestablished. See Chapter 10 for more details.

### Line length greater than 250

You have attempted to transfer a file that is too long for sending to another IBM Personal Computer. You probably tried to transfer a non-ASCII BASIC file or some other non-text file. If transferring a BASIC program, make sure you save the program using the BASIC SAVE command with the ASCII option.

### Line too long to upload

The program encountered a line longer than 130 characters during Upload. You may have tried to upload a non-ASCII BASIC file or some other non-text file. If uploading a BASIC program, make sure you save the program using the BASIC SAVE command with the ASCII option.

### Name must end in '.Text'

When uploading to TSO, only files with a Data Set Type of TEXT can be specified on the TSO system (for example, TRUTH.TEXT).

### No blanks permitted in name

For the Upload, Download, or Compare functions with a TSO host system, no blanks can be specified as part of a filename. Filetypes should be specified using the dot (.) notation. Thus, a file with the name TRUTH and a filetype TEXT should be specified as **TRUTH.TEXT**.

## No characters entered

You pressed the Enter ($\leftarrow$) key in response to **Enter one (or more) return characters (separated by spaces)**. Another message asks for the name of the local file to be sent to the host. Enter the filename or press Enter ($\leftarrow$) to return to the Function Selection Menu.

## Null file found for *filename*

The file on your IBM Personal Computer that you are attempting to Upload, Download, Compare, or Send is empty.

## On return, make sure you are out of host editor

After you return to terminal operation, check to make sure that you have successfully exited the host editor used by Upload. See the **Save uploaded data** message for more information.

## Overrun error

A character was received by the Asynchronous Communications Adapter before the previous character was processed by the Communications Program. This error indicates that at least one character of data was lost.

## Parity error

A parity error has been detected on a character received from the communications line. If parity errors occur frequently during receipt of data, you may have selected the wrong parity checking option. See the section "Turning ON/OFF the Display of Receive Errors" in Chapter 10 for further details. If these errors occur together with the appearance of meaningless characters, you are probably operating at the wrong line bit rate.

When a modem is connected to or disconnected from a telephone line, meaningless characters are often generated. Such characters can cause parity errors. An occasional parity error during operation as a terminal or during Upload or Download indicates that errors in transmission may be occurring. Check the quality of the communication line.

## Part of file not sent

Transmission of a file from an IBM Personal Computer was stopped by the transmitting IBM Personal Computer before the entire file was transmitted.

## Please wait - program initializing...

The Communications Program is loading and initializing.

### Print off/buffer near full

The printing of your terminal session on the parallel printer has been turned OFF because the receive buffer is getting too full. This situation generally occurs at line transmission rates of 1200 bits per second or higher, because the printer is unable to keep up with data input from the host computer at those rates. To avoid this problem, request shorter segments of text when making listings from the host system and wait for the printer to catch up on each segment listed.

### Print off - printer fault

The printing of your terminal session on the parallel printer has been turned OFF because the printer is unable to print. The most common causes of this condition are:

- The printer is not ready
- The printer power is OFF
- The printer is out of paper

### Ready to receive file

The receiving IBM Personal Computer is ready to receive a file. This message is transmitted roughly every 15 seconds until the transmitting IBM Personal Computer sends the message **Starting file transmission.**

### Ready to send *filename*

The transmitting IBM Personal Computer is ready to send the specified file. This message should appear on the screens of both the transmitting and receiving IBM Personal Computers.

Receive buffer overflow

See **Buffer has overflowed** message.


Received characters (and their Hex codes):

When you press the [F1] key to stop File Sending, the Communications Program displays the characters received from the host in response to the last line sent. Refer to "Determining the Return Characters" in Chapter 8.


Redo from Start

This is a BASIC error, caused by erroneous input. Reenter the requested number.


**Replace diskette to retry close.**
**Retry close (Y or N)?**

See **File close failed** message.


**RS232INT not loaded. Do a System Reset**

RS232INT, the Base Program required for operation of the Communications Program, has not loaded. To load it, make sure the Communications Program is in the default drive, and perform a System Reset. ·


Return to EDIT failed

In returning from TSO INPUT mode during termination of Upload, EDIT mode was not reached successfully. Return to terminal mode and check on the status of the file. Make sure you are out of EDIT before trying another file transfer.

**SAVE failed**
*Message*

On completing uploading to a TSO host system, the file could not be successfully saved with the TSO editor. The *message* that follows is issued by TSO.

**Save uploaded data (Y returns to host editor N cancels Upload)?**

Uploading of a file ended before all of the lines in the local file were moved to the host system file. Enter **Y** (or **YES**) if you wish to save the portion of the file that was uploaded. This returns you to the host Editor. Then manually save the portion of the file that has been uploaded.

Enter **N** (or **NO**) to cancel Upload and return to terminal operation. In this case, the file you were uploading is probably not saved on the host. When you return to terminal operation, check to be sure you are back at the host command level. (On VM/370, if you press Enter ( ⏎ ), the response **CMS** indicates you are in CMS command level. On MVS/TSO, if you press Enter ( ⏎ ), the response **READY** indicates you are at the TSO command level.)

**Single CR missing at beginning**

When performing an Upload or Download with VM/370, the Editor normally responds with a Carriage Return prior to any other response. You see the **Single CR missing at beginning** message whenever that Carriage Return does not occur. This message is likely to appear in two instances.

First, you have not entered the CMS command level in VM/370. Second, you are operating with a system that is echoing back characters transmitted over the communications line. See Chapter 10 for steps to recover from this error.

**Specify either 40 or 80**

In setting the screen width at program startup, you specified a width not equal to either 40 or 80. These are the only screen widths supported. Specify a width of 80 unless you cannot legibly display 80 characters across the screen.

**Starting file transmission**

The IBM Personal Computer is ready to begin transmitting file lines. If you are using the Personal Computer to Personal Computer transmission function, this message should appear on both the transmitting and receiving IBM Personal Computers.

**Starting in RECEIVE state**
**Use F5 (or F1 after VM/370 connect) to go to SEND State**

When operating as a VM/370 terminal, the terminal is initialized in the RECEIVE state so messages from the host will be displayed. The program can be put into SEND state (so you can type) by pressing (F1) or (F5). (F1) sends a BREAK signal to VM/370. The response from this BREAK switches the terminal to SEND state. (F5) forces you directly to SEND state.

**SYSERR ##**

An error has occurred in trying to start up as a terminal. Turn your IBM Personal Computer OFF and then ON, and restart the Communications Program. If the problem persists, check the Communications Adapter Card.

### Terminal connection never established

This message is issued when you try to disconnect the communications line, but you were never in terminal operation.

### Too many files

In opening a file for output, you exceeded the maximum number of filenames permitted in a diskette directory. The maximum number permitted is 64. Erase one or more existing files or use a different diskette where filename space is available.

### Transmission completed

Transmission of a file between IBM Personal Computers completed with all file lines transmitted successfully.

### Transmission ended at receiver's request

When transferring files between two IBM Personal Computers, the receiving IBM Personal Computer has requested termination of the file transfer. An associated message gives the reason for the termination. Not all of the file will have been transmitted.

### Transmit buffer full

The transmit buffer is full and will not accept any more characters for transmission. You are probably disconnected from the communications line.

### Try another filename (Y or N)?

The file you tried to access could not be accessed for reasons given in previous messages. If you answer Yes to this question, you may enter another filename. Answering No returns you to the Terminal Feature Menu.


### Upload ended abnormally

Either part of the local file has not been transmitted correctly to the host system, or the host system failed to properly exit the editor being used. An associated message gives the reason.


### Wait for return character from host after each line sent (Y or N)?

If you wish to wait for a return character to be sent from the host after each line is sent, enter Y. If you wish to use XON/XOFF support, enter N.


### You are back as a terminal

You have returned to operation as a terminal. To determine the status of the host system, press the Enter ($\leftarrow$) key.


### You are starting up as a terminal

The program that communicates with the communications line has been initialized and you are ready to start operation as a terminal. See the section "Starting Up as a Terminal" in Chapter 2 for more details.

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# APPENDIX B.  USING THE KEYBOARD WHEN OPERATING AS A TERMINAL

This section describes the use of the keys on the IBM Personal Computer keyboard when you are running the Communications Program and operating as a terminal.

The keyboard is divided into three areas:

- The *typewriter* area in the middle

- Ten *function keys* on the left side of the keyboard

- The *numeric keypad* on the right side

See the picture of the keyboard on the following page:

Figure 2. The IBM Personal Computer Keyboard

# Typewriter Keyboard

The typewriter area of the keyboard behaves much like a typewriter with letters, numbers, and special characters. Capital letters, and the special characters shown above the numbers on the number keys, are typed by holding down either of the Shift keys ( ⇧ ) and pressing the desired key. These characters are transmitted to the host computer as they are typed.

> **Note:** In this appendix, when we refer to two keys that must be used together, holding the first key down while pressing the second key, we will show the keys separated by a hyphen, as in ⇧-PrtSc.

# Special Keys and Symbols

You find some special symbols on this keyboard that you won't find on a regular typewriter, such as [ and ]. Also, some characters are not where you might expect them to be if you are used to using a typewriter. For example, the uppershift comma is not a comma, but the < symbol.

## The Enter Key

The key with the (↵) symbol on it is the *Enter* key.

When operating as a full duplex terminal, pressing the Enter (↵) key transmits a Carriage Return (or other line end character) to the host computer.

When operating as a VM/370 (or other half duplex protocol) terminal, pressing the Enter (↵) key signals to the host computer that you have completed transmission of a line of input and switches the terminal from SENDING to RECEIVING mode.

# Uppercase

This keyboard does not have a normal Shift Lock
key. The ⌈Caps Lock⌋ key, to the right of the Space Bar, is
similar to a Shift Lock key, but it only gives you
uppercase letters. It does not give uppercase
characters on any other keys. After you press the
⌈Caps Lock⌋ key, you continue to get uppercase letters until
you press the ⌈Caps Lock⌋ key again. You can get lowercase
letters when in Shift Lock state by pressing and
holding one of the Shift (⌈⇧⌋) keys. When you
release the Shift (⌈⇧⌋) key, you go back to Shift
Lock state.

# Backspace

The Backspace key, with the symbol ⌈←⌋ , on the
upper row of the typewriter area, behaves somewhat
differently from the Backspace key on a typewriter.
It not only backspaces, but it erases from the screen
what you have typed if you are using *local* character
echoing. It also transmits the backspace character
(hex 08) to the host computer. As the characters
that you delete on the screen with the backspace
were already sent to the host computer, the host
computer should be programmed to discard one
character for each backspace received.

# PrtSc

Below the Enter (⌈←⌋) key is a key labeled PrtSc on
top and * on the bottom ( ⌈PrtSc⌋ ). *PrtSc* stands for
*Print Screen*. When the keyboard is in lowershift,
pressing this key causes an asterisk to be typed. In

uppershift, however, this is a special key that causes a copy of what is on the screen to be printed on the printer.

> **IMPORTANT:** Use the ⟨⇧⟩-⟨PrtSc⟩ keys only when you are not receiving output from the host computer. The operation of the Communications Program is inhibited during the printing of the screen and a receive buffer overflow could result.

# Special Key Combinations

You should be aware of the special functions of the following combinations of keys:

## Ctrl-Break

This combination interrupts program execution and returns to BASIC. In general, you should use this function only when you have no other way of recovering from a problem with the Communications Program.

## Alt-Ctrl-Del

This combination is a *System Reset*. A System Reset is similar to switching the computer off and on. After a System Reset, the Communications Program is reloaded. Again, use this function only if you have no other means of recovering from a problem.

# APPENDIX C. TERMINAL PARAMETERS AND DEFAULTS

## Format of Parameters

The parameters that describe the different types of terminals follow. These parameters are listed on your screen when you select your terminal features in the Communications Program. The default values for the different types of terminals are listed at the end of this appendix.

1. Line Bit Rate (Bits/Second)

   1   75
   2   110
   3   150
   4   300
   5   600
   6   1200
   7   1800
   8   2400
   9   4800
   10  9600

2. Type of Parity Checking

   1   None
   2   Odd
   3   Even
   4   Mark
   5   Space

3. Number of Stop Bits

    1    One Bit
    2    Two Bits

4. Reserved

5. Half or Full Duplex Terminal Protocol (never displayed)

    1    Half Duplex
    2    Full Duplex

6. XON/XOFF Support

    1    XON/XOFF Control Supported
    2    XON/XOFF Control Not Supported

7. Line Turnaround Character Sent to Host

    1    Carriage Return (Hex 0D)
    2    XON (Hex 11)
    3    XOFF (Hex 13)
    4    EOT End of Transmission (Hex 04)
    5    Line Feed (Hex 0A)
    6    Carriage Return Without New Display Line

8. Line Turnaround Character Sent by Host

    1    Carriage Return (Hex 0D)
    2    XON (Hex 11)
    3    XOFF (Hex 13)
    4    EOT End of Transmission (Hex 04)
    5    Line Feed (Hex 0A)

9. Local or Host Character Echoing

    1    Characters displayed locally as they are typed
    2    Only characters received from host are displayed

10. First Character(s) to be Deleted

    1    No Character Specified
    2    Carriage Return (Hex 0D)
    3    Line Feed (Hex 0A)
    4    Bell (Hex 07)
    5    XON (Hex 11)
    6    XOFF (Hex 13)
    7    Escape (Hex 1B)
    8    Tab (Hex 09)
    9    Backspace (Hex 08)
    10   All Unused Control Characters (see Note at end of list)

11. Second Character(s) to be Deleted

    1    No Character Specified
    2    Carriage Return (Hex 0D)
    3    Line Feed (Hex 0A)
    4    Bell (Hex 07)
    5    XON (Hex 11)
    6    XOFF (Hex 13)
    7    Escape (Hex 1B)
    8    Tab (Hex 09)
    9    Backspace (Hex 08)
    10   All Unused Control Characters (see Note at end of list)

12. Third Character(s) to be Deleted

    1    No Character Specified
    2    Carriage Return (Hex 0D)
    3    Line Feed (Hex 0A)
    4    Bell (Hex 07)
    5    XON (Hex 11)
    6    XOFF (Hex 13)
    7    Escape (Hex 1B)
    8    Tab (Hex 09)
    9    Backspace (Hex 08)
    10   All Unused Control Characters (see Note at end of list)

13. Fourth Character(s) to be Deleted

    1   No Character Specified
    2   Carriage Return (Hex 0D)
    3   Line Feed (Hex 0A)
    4   Bell (Hex 07)
    5   XON (Hex 11)
    6   XOFF (Hex 13)
    7   Escape (Hex 1B)
    8   Tab (Hex 09)
    9   Backspace (Hex 08)
    10  All Unused Control Characters (see Note
        at end of list)

14. Type of Terminal (for Upload/Download Use)
    (never displayed)

    0   Upload/Download not supported
    1   VM/370 Terminal
    2   TSO Terminal
    3   Two Personal Computers talking

15. Line End Characters Sent by Host

    1   Carriage Return (Hex 0D)
    2   XON (Hex 11)
    3   XOFF (Hex 13)
    4   EOT-End of Transmission (Hex 04)
    5   Line Feed (Hex 0A)

16. Communications Adapter Address

    1   Communications Adapter 1
    2   Communications Adapter 2

Parameters 17 and 18 are reserved. Parameters 19 and 20 are available for a user specified terminal.

> Note: When you select **All Unused Control Characters**, the following control characters (in hex) are deleted:
>
> 0, 1, 2, 3, 5, 6, B, C, E, F, 10, 12, 14, 15, 16, 18, 19, 1A, 1D, 1E, 1F
>
> Refer to "How to Use the Hex Listing" in Chapter 10 for more information.

# Default Parameters

The table in Figure 3 shows the default parameter values for the different types of terminals that can be accessed from the Terminal Selection Menu. These values are built into the program. When you request one of these terminals from the Terminal Selection Menu, you can modify only those items marked with an asterisk (*) in Figure 3.

If you wish to modify other items, you can access one of the specification files on the Communications Program diskette. Each of these files has identical default parameters to one of the terminals on the Terminal Selection Menu. However, when you load one of these files, you can modify any of the pertinent parameters for that terminal.

The files for the terminals are as follows:

| Terminal | File |
|---|---|
| Dow Jones Service or THE SOURCE | **DOWMOD.TER** |
| VM/370 | **VMMOD.TER** |
| MVS/TSO | **TSOMOD.TER** |
| User Specified Terminal | No specification file |
| Personal Computer Communications | **PCMOD.TER** |

The following notation is used in the table in Figure 3:

**\*(Asterisk)** You can change this parameter by selecting a menu item during the terminal selection phase of operation.

**N/A** Not applicable. Some parameters are not used by a terminal protocol. (For example, character echoing does not apply to half duplex operation.) N/A parameters are not used by a particular type of terminal.

**Not Used** These parameters are reserved.

| Terminal Parameter | Dow Jones Service or THE SOURCE | VM/370 | TSO | User Specified | IBM Personal Computers |
|---|---|---|---|---|---|
| 1 Line Bit Rate | *300 bps | *300 bps | *300 bps | *300 bps | *300 bps |
| 2 Parity Checking | Even | *Mark | *Mark | *Mark | Even |
| 3 Number of Stop Bits | One | One | One | *One | One |
| 4 Reserved | Not Used | Not Used | Not Used | Not Used | Not Used |
| 5 Terminal Protocol | Full Duplex | Half Duplex | Full Duplex | Full Duplex | Full Duplex |
| 6 XON/XOFF | Not Supported | N/A | Not Supported | *Supported | Supported |
| 7 Turnaround Char Sent to Host | Carriage Return | *CR (without screen linefeed) | *CR (without screen linefeed) | *Carriage Return | Carriage Return |
| 8 Turnaround Char Sent by Host | N/A | XON | N/A | N/A | N/A |
| 9 Local or Host Echo | Host | N/A | Local | *Local | Local |
| 10 First Deleted Char. | Line Feed | Line Feed | Carriage Return | *None | None |
| 11 Second Deleted Char. | XOFF | XOFF | XON | *None | None |
| 12 Third Deleted Char. | XON | All Unused Characters | XOFF | *None | None |
| 13 Fourth Deleted Char. | All Unused Characters | None | All Unused Characters | *None | None |
| 14 Type of Terminal | Not Any | VM/370 | TSO | Not Any | Personal Computer |
| 15 Line End Char Sent by Host | Carriage Return | Carriage Return | Line Feed | *Carriage Return | Carriage Return |
| 16 Comm. Adapter Address | Comm. Adapter 1 | Comm. Adapter 1 | Comm. Adapter 1 | *Comm. Adapter 1 | Comm. Adapter 1 |
| 17-18 Reserved | Not Used | Not Used | Not Used | Not Used | Not Used |
| 19-20 User Specified Terminal | N/A | N/A | N/A | N/A | N/A |

Figure 3. Default Parameters

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# APPENDIX D. PROTOCOLS

## Upload, Download, and Compare Programs (VM/370 and TSO)

The Upload, Download, and Compare functions support most VM/370 and MVS/TSO system control programs executing on an IBM computer. This appendix describes the protocols utilized by the IBM Personal Computer when communicating with VM/370 and MVS/TSO and other personal computers.

You may need to know how the IBM Personal Computer interacts with VM/370 and MVS/TSO if, for some reason, the functions do not perform as . expected. If you have problems, you should contact the host system support personnel and have them determine if the host is following the protocol described below. Some host system VM/370 and MVS/TSO support may have been modified, so that their protocols are no longer as expected by the IBM Personal Computer. If this is the case, you have two options:

- Use the general file transfer facility described in Chapter 8 to send and receive files.

- Modify the BASIC TERMINAL.BAS program to send editor commands and recognize editor messages compatible with the system.

The Upload, Download, and Compare programs use the VM/370 (CMS) and MVS/TSO Editors for accessing files on their respective systems.

The programs simulate a user sitting at a terminal accessing an editor. Thus, for uploading, the system simulates a user calling up the editor on a new file, going into input mode, and then typing lines of input. The lines of input come from the local file that is being uploaded from the IBM Personal Computer. We talk about *lines* of input or output. For the purposes of this discussion, a *line* placed on or taken from a file is the same as a *record* on that file.

# Downloading

The system first requests a local filename and a host filename from the user. The file with the local filename is opened for output on the IBM Personal Computer. The program then attempts to invoke the system editor using the host filename given by the user. If this file does not exist on the host system, or cannot be accessed for some other reason, this fact is reported back to the user for the opportunity of entering another filename (or returning to the Function Selection Menu).

The protocol for invoking the editor is different for VM/370 and MVS/TSO. If the editor, when called, finds an existing file, the program is now ready to begin downloading lines to the local file. At this point the program goes into a loop. A subroutine is called that obtains lines from the host system by having an editor type each successive line of the file (using the NEXT command in the VM/370 Editor, for example). Again, a separate access subroutine performs this function for each host editor supported. This subroutine returns one line at a time. If a line from the file on the host system contains more than one line end character (it might contain multiple Carriage Returns), it is broken up by this subroutine into multiple lines each representing a piece of text ending with a Carriage Return.

Carriage Returns that appear in a line of a file with another Carriage Return or nothing in front of them are translated to a single space. Thus, a **null** line is translated into a line consisting of a single blank character.

As each line is received from the host system, it is stored as a line on the local file. Because extra Carriage Returns in a host file generate null lines, the number of lines written on the local file may be larger than the number read from the host file. Counters keep track of the number of lines of each of these files and these numbers are displayed in error messages.

When the last record from the host file is read, the program gives commands to the host editor to exit the editor (for example, a QUIT command for the VM/370 Editor). The Compare function uses the same access of the host system as does Download. The commands that the host system sees are identical for Download and Compare. The Compare function opens the local file for input. As each line is received from the host system it is compared with the corresponding line on the local file. This operation continues until a line fails to compare or the program runs out of lines on the local and/or the host system. When one system runs out of lines ahead of the other, an appropriate message is given to the user.

# Uploading

The Upload program also operates in a manner quite similar to Download. The names of the local and host files are requested. The local file is checked to make sure it exists; the editor is then invoked for the host filename given. If the host file already exists, the program refuses to upload to it. If the host file can be opened as a new file, the editor is put

into input mode. The program now goes into a loop, reading lines from the local file and transmitting them one at a time to the host system.

A null line on the local file is translated into a single blank. Thus, null lines are never transmitted, so the editor is never taken out of input mode. After all of the lines are read from the local file, commands are given to save the file that was created during input to the editor. Thus, for VM/370 a FILE command is issued to the editor. A check is made to see if the file was successfully saved. If file saving fails, the user is given the options of closing out the file (losing it on the host system) or returning to terminal operation while still in the editor. In the latter case, the user can attempt to rectify the cause of the failure to save the file. (For example, if the file was not saved due to a lack of space on the host system, the user could erase other files to make space and then manually save the file.)

# Protocol Used in Upload and Download

This section describes the protocol used on VM/370 and MVS/TSO for uploading, downloading, and comparing files. The protocol used with the host is the same for Download and Compare.

In this discussion, *REPLY* means a line of text from the host ending with (or consisting of) a line end character. *Line End* is that line end character. It is the one selected in the menu as **Line End Character Sent** by **Host**. *SEND* means to transmit a line to the host system. *filespec* is what the user types in response to a request for a host filename.

> IMPORTANT: The following sections describe what the Communications Program does. They *do not* represent operator actions.

# TSO Download

## Phase 1 – Accessing Host Editor

1. SEND "EDIT filespec NONUM OLD".

2. Wait for a REPLY.

3. If REPLY = Line End, get another REPLY.

4. If REPLY = "EDIT", the TSO editor is correctly accessed.

5. SEND "VERIFY ON" and ignore REPLY.

6. If REPLY does not equal "EDIT", Download terminates with an error message.

## Phase 2 – Downloading Lines

1. SEND "DOWN".

2. Wait for a REPLY.

3. If REPLY = Line End, get another REPLY.

4. Take REPLY as next line.

5. IF REPLY = "END OF DATA", then next REPLY is the last line.

6. Save each line on file as received and repeat process until last line received.

## Phase 3 – Ending Host Editor Session

1. SEND "END".

2. Wait for a REPLY.

3. If REPLY = Line End, get another REPLY.

4. If next REPLY does not equal "READY", host gives an error message.

# TSO Upload

## Phase 1 – Accessing Host Editor

1. Check to make sure filespec ends in ".TEXT". If not, exit with an error message.

2. SEND "EDIT filespec NONUM".

3. If REPLY = Line End, get another REPLY.

4. If REPLY begins with "DATA", get another REPLY.

5. If REPLY does not begin with "DATA", host gives an error message.

6. If REPLY equals "INPUT", Editor is in input mode and is ready to send lines of text to host.

7. If REPLY does not equal "INPUT", exit with an error message.

## Phase 2 – Uploading Lines

1. Get a line from the local file.

2. If it is a null line, convert it to a single blank.

3. Transmit it to the host.

4. Wait for a REPLY.

5. If REPLY is a single blank or a Line End, repeat 1 through 4 until last line on local file is sent.

6. If REPLY is not a single blank or a Line End, then stop transmission with an error message.

## Phase 3 – Ending Host Editor Session

1. SEND null line (to get Editor out of INPUT mode).

2. Receive two REPLYs.

3. SEND "SAVE".

4. Receive one REPLY.

5. If REPLY equals "EDIT", send "END".

6. Receive two REPLYs.

7. If second REPLY equals "READY", Upload is complete.

8. Otherwise, host sends error message.

# VM/370 Access

## General Note:

Whenever a REPLY is obtained from the VM/370 host, a single Line End character should be found at the beginning of the REPLY. If found, it is discarded. If not found, the error message **Single CR missing at beginning** is given. In all of the discussion that follows, the REPLYs have had this Line End deleted.

# VM/370 Download

## Phase 1 – Accessing Host Editor

1.  SEND "EDIT filespec".

2.  If REPLY equals "EDIT:", host has been successfully accessed.

3.  If REPLY = "NEW FILE:", exit with error message **Host file not present.**

4.  If REPLY does not equal "EDIT:", exit with an error message.

## Phase 2 – Downloading Lines

VM/370 can send one or more lines of text (ending with or consisting of Line End characters) each time an "N" command is sent to the host.

Each of these lines is saved as a line on the local file. Each time a Line Turnaround character is received from the host, another "N" is transmitted to the host.

If the line received = "EOF:", then receipt of the lines is terminated.

## Phase 3 – Ending Host Editor Session

1.  SEND "QUIT" to host.

2.  Receive one REPLY.

# VM/370 Upload

## Phase 1 – Accessing Host Editor

1.  SEND "EDIT filespec (LRECL 132)".

2.  If REPLY = "NEW FILE", Editor has been successfully accessed.

    SEND the following editor commands, ignoring the REPLYs:

    a.  "CASE M"

    b.  "RECFM V"

    c.  "IMAGE CANON"

    d.  "LINE OFF"

    e.  "I" (to put into INPUT mode)

3.  If REPLY = "EDIT", exit with message **Host file already exists.**

4.  If REPLY does not equal "NEW FILE:", exit with error message.

## Phase 2 – Uploading Lines

1. Get a line from the local file.

2. If null, convert to a single blank.

3. SEND line.

4. If REPLY does not equal a blank or a Line End, then stop with an error message.

5. Otherwise repeat steps 1 to 4 until all of the lines on the local file have been sent.

## Phase 3 – Ending Host Editor Session

1. Send null line (to get Editor out of INPUT mode).

2. Receive one REPLY.

3. SEND "FILE".

4. If REPLY does not begin with "R:", host gives error message indicating possible problem on host.

# File Transfers Between IBM Personal Computers

This section describes the protocols used for file transfers between IBM Personal Computers described in Chapter 7.

If you want to transfer a file between an IBM Personal Computer and a non-IBM personal computer, you can use the general file transfer facilities discussed in Chapter 8. However, if you want to use the facilities discussed in Chapter 7, you need to have a program on the non-IBM personal computer that uses the protocol described below.

- All data is transmitted in lines, and each line is terminated with a Carriage Return (CR$) character.

- The following control codes are used in the descriptions below:

  CR$ Carriage Return (Hex 0D)

  XON$ XON Character (Hex 11)

  XOFF$ XOFF Character (Hex 13)

  IBG$ Begin Transmission Code (Hex 1C)

  ITM$ Terminate Transmission Code (Hex 17)

- Transmission operates with a full duplex terminal protocol in which the program checks for received information between transmission of lines of data.

# Transmitting a File from a
# Non-IBM Personal Computer

The program written for a non-IBM personal
computer to transmit a file to an IBM Personal
Computer should operate as follows:

1. The program opens for input the file to be
   transmitted.

2. The program loops, reading the
   communications line and waiting for reception
   of a text line ending with the control characters
   IBG$ CR$.

3. When such a line is received, the program sends
   a text line ending with IBG$ CR$. (This line
   can contain an informative message as well,
   such as **Starting file transmission.**)

4. The program transmits the file. Each line
   (record) in the file should be sent as a line
   ending in a Carriage Return (CR$).

5. While transmission is taking place the program
   should monitor the input from the
   communications line and take the following
   actions:

   a. If an XOFF$ CR$ is seen, stop
      transmission of lines. When an XON$
      CR$ is seen, resume transmission.

   b. If a line ending in ITM$ CR$ is seen, stop
      all transmission. This line will contain as
      text the reason the receiving IBM Personal
      Computer has requested termination.

   c. When all lines in the file have been sent,
      the program should send a line ending in
      ITM$ CR$. (This line can contain an
      appropriate message, such as **File
      transmission completed.**)

# Receiving a File Transmitted by an IBM Personal Computer

The program that runs in a non-IBM personal computer and receives a file from an IBM Personal Computer should operate as follows:

1. A file is opened for output, ready for writing the received file.

2. The program loops, sending out a message ending in IBG$ CR$ every 15 to 20 seconds. (This message may also contain text, such as Ready to receive file.)

3. During the loop in Step 2, the communications line is continually monitored for messages from the IBM Personal Computer. When a line ending in IBG$ CR$ is received, the program moves on to Step 4.

4. Each line received (after the one ending in IBG$ CR$) is stored as a file record. As these lines end with Carriage Returns (CR$), the program might delete the CR$ before storing a line. Before storing a line, the program checks it to see if it ends in ITM$ CR$. If it does, the program does not store that line, but closes the file and stops operation.

5. The program can stop transmission by the IBM Personal Computer by sending a line ending with an ITM$ CR$. This line may also contain a message giving the reason for the termination.

6. If the program is receiving lines faster than they can be stored, it can suspend transmission by sending a line consisting of an XOFF$ CR$ to the IBM Personal Computer. When it has caught up with the input, it can start up transmission by sending a line consisting of an XON$ CR$ to the IBM Personal Computer.

# APPENDIX E.  ASCII CHARACTER CODES

The following table lists all of the ASCII codes (in decimal and hexadecimal) and their associated characters. The column headed "Control Characters" lists the standard interpretations of ASCII codes 0 to 31 (usually used for control functions and communications).

| ASCII Value | Hex Value | Character | | Control Character |
|---|---|---|---|---|
| 000 | 00 | (null) | | NUL |
| 001 | 01 | ☺ | | SOH |
| 002 | 02 | ☻ | | STX |
| 003 | 03 | ♥ | | ETX |
| 004 | 04 | ♦ | | EOT |
| 005 | 05 | ♣ | | ENQ |
| 006 | 06 | ♠ | | ACK |
| 007 | 07 | • | (beep) | BEL |
| 008 | 08 | ◘ | (backspace) | BS |
| 009 | 09 | ○ | (tab) | HT |
| 010 | 0A | ◙ | (line feed) | LF |
| 011 | 0B | ♂ | (home) | VT |
| 012 | 0C | ♀ | (form feed) | FF |
| 013 | 0D | ♪ | (carriage return) | CR |
| 014 | 0E | ♫ | | SO |
| 015 | 0F | ☼ | | SI |
| 016 | 10 | ► | | DLE |
| 017 | 11 | ◄ | | DC1 |
| 018 | 12 | ↕ | | DC2 |
| 019 | 13 | ‼ | | DC3 |
| 020 | 14 | ¶ | | DC4 |
| 021 | 15 | § | | NAK |
| 022 | 16 | ▬ | | SYN |
| 023 | 17 | ↨ | | ETB |
| 024 | 18 | ↑ | | CAN |
| 025 | 19 | ↓ | | EM |
| 026 | 1A | → | | SUB |
| 027 | 1B | ← | | ESC |
| 028 | 1C | ∟ | (cursor right) | FS |
| 029 | 1D | ↔ | (cursor left) | GS |
| 030 | 1E | ▲ | (cursor up) | RS |
| 031 | 1F | ▼ | (cursor down) | US |

| ASCII Value | Hex Value | Character | ASCII Value | Hex Value | Character |
|---|---|---|---|---|---|
| 032 | 20 | (space) | 064 | 40 | @ |
| 033 | 21 | ! | 065 | 41 | A |
| 034 | 22 | '' | 066 | 42 | B |
| 035 | 23 | # | 067 | 43 | C |
| 036 | 24 | S | 068 | 44 | D |
| 037 | 25 | % | 069 | 45 | E |
| 038 | 26 | & | 070 | 46 | F |
| 039 | 27 | ' | 071 | 47 | G |
| 040 | 28 | ( | 072 | 48 | H |
| 041 | 29 | ) | 073 | 49 | I |
| 042 | 2A | * | 074 | 4A | J |
| 043 | 2B | + | 075 | 4B | K |
| 044 | 2C | ' | 076 | 4C | L |
| 045 | 2D | - | 077 | 4D | M |
| 046 | 2E | . | 078 | 4E | N |
| 047 | 2F | / | 079 | 4F | O |
| 048 | 30 | 0 | 080 | 50 | P |
| 049 | 31 | 1 | 081 | 51 | Q |
| 050 | 32 | 2 | 082 | 52 | R |
| 051 | 33 | 3 | 083 | 53 | S |
| 052 | 34 | 4 | 084 | 54 | T |
| 053 | 35 | 5 | 085 | 55 | U |
| 054 | 36 | 6 | 086 | 56 | V |
| 055 | 37 | 7 | 087 | 57 | W |
| 056 | 38 | 8 | 088 | 58 | X |
| 057 | 39 | 9 | 089 | 59 | Y |
| 058 | 3A | : | 090 | 5A | Z |
| 059 | 3B | ; | 091 | 5B | [ |
| 060 | 3C | < | 092 | 5C | \ |
| 061 | 3D | = | 093 | 5D | ] |
| 062 | 3E | > | 094 | 5E | ∧ |
| 063 | 3F | ? | 095 | 5F | — |

**APPENDIXES**

| ASCII Value | Hex Value | Character | ASCII Value | Hex Value | Character |
|---|---|---|---|---|---|
| 096 | 60 | ' | 128 | 80 | Ç |
| 097 | 61 | a | 129 | 81 | ü |
| 098 | 62 | b | 130 | 82 | é |
| 099 | 63 | c | 131 | 83 | â |
| 100 | 64 | d | 132 | 84 | ä |
| 101 | 65 | e | 133 | 85 | à |
| 102 | 66 | f | 134 | 86 | å |
| 103 | 67 | g | 135 | 87 | ç |
| 104 | 68 | h | 136 | 88 | ê |
| 105 | 69 | i | 137 | 89 | ë |
| 106 | 6A | j | 138 | 8A | è |
| 107 | 6B | k | 139 | 8B | ï |
| 108 | 6C | l | 140 | 8C | î |
| 109 | 6D | m | 141 | 8D | ì |
| 110 | 6E | n | 142 | 8E | Ä |
| 111 | 6F | o | 143 | 8F | Å |
| 112 | 70 | p | 144 | 90 | É |
| 113 | 71 | q | 145 | 91 | œ |
| 114 | 72 | r | 146 | 92 | Æ |
| 115 | 73 | s | 147 | 93 | ô |
| 116 | 74 | t | 148 | 94 | ö |
| 117 | 75 | u | 149 | 95 | ò |
| 118 | 76 | v | 150 | 96 | û |
| 119 | 77 | w | 151 | 97 | ù |
| 120 | 78 | x | 152 | 98 | ÿ |
| 121 | 79 | y | 153 | 99 | Ö |
| 122 | 7A | z | 154 | 9A | Ü |
| 123 | 7B | { | 155 | 9B | ¢ |
| 124 | 7C | | | 156 | 9C | £ |
| 125 | 7D | } | 157 | 9D | ¥ |
| 126 | 7E | ~ | 158 | 9E | Pt |
| 127 | 7F | ⌂ | 159 | 9F | ƒ |

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| ASCII Value | Hex Value | Character | ASCII Value | Hex Value | Character |
|---|---|---|---|---|---|
| 160 | A0 | á | 192 | C0 | └ |
| 161 | A1 | í | 193 | C1 | ┴ |
| 162 | A2 | ó | 194 | C2 | ┬ |
| 163 | A3 | ú | 195 | C3 | ├ |
| 164 | A4 | ñ | 196 | C4 | ─ |
| 165 | A5 | Ñ | 197 | C5 | ┼ |
| 166 | A6 | ª | 198 | C6 | ╞ |
| 167 | A7 | º | 199 | C7 | ╟ |
| 168 | A8 | ¿ | 200 | C8 | ╚ |
| 169 | A9 | ⌐ | 201 | C9 | ╔ |
| 170 | AA | ¬ | 202 | CA | ╩ |
| 171 | AB | ½ | 203 | CB | ╦ |
| 172 | AC | ¼ | 204 | CC | ╠ |
| 173 | AD | ¡ | 205 | CD | ═ |
| 174 | AE | « | 206 | CE | ╬ |
| 175 | AF | » | 207 | CF | ╧ |
| 176 | B0 | ░ | 208 | D0 | ╨ |
| 177 | B1 | ▒ | 209 | D1 | ╤ |
| 178 | B2 | ▓ | 210 | D2 | ╥ |
| 179 | B3 | │ | 211 | D3 | ╙ |
| 180 | B4 | ┤ | 212 | D4 | ╘ |
| 181 | B5 | ╡ | 213 | D5 | ╒ |
| 182 | B6 | ╢ | 214 | D6 | ╓ |
| 183 | B7 | ╖ | 215 | D7 | ╫ |
| 184 | B8 | ╕ | 216 | D8 | ╪ |
| 185 | B9 | ╣ | 217 | D9 | ┘ |
| 186 | BA | ║ | 218 | DA | ┌ |
| 187 | BB | ╗ | 219 | DB | █ |
| 188 | BC | ╝ | 220 | DC | ▄ |
| 189 | BD | ╜ | 221 | DD | ▌ |
| 190 | BE | ╛ | 222 | DE | ▐ |
| 191 | BF | ┐ | 223 | DF | ▀ |

| ASCII Value | Hex Value | Character |
|---|---|---|
| 224 | E0 | $\alpha$ |
| 225 | E1 | $\beta$ |
| 226 | E2 | $\Gamma$ |
| 227 | E3 | $\pi$ |
| 228 | E4 | $\Sigma$ |
| 229 | E5 | $\sigma$ |
| 230 | E6 | $\mu$ |
| 231 | E7 | $\tau$ |
| 232 | E8 | $\Phi$ |
| 233 | E9 | $\Theta$ |
| 234 | EA | $\Omega$ |
| 235 | EB | $\delta$ |
| 236 | EC | $\infty$ |
| 237 | ED | $\emptyset$ |
| 238 | EE | $\epsilon$ |
| 239 | EF | $\cap$ |
| 240 | F0 | $\equiv$ |
| 241 | F1 | $\pm$ |
| 242 | F2 | $\geq$ |
| 243 | F3 | $\leq$ |
| 244 | F4 | $\lceil$ |
| 245 | F5 | $\rfloor$ |
| 246 | F6 | $\div$ |
| 247 | F7 | $\approx$ |
| 248 | F8 | $\circ$ |
| 249 | F9 | $\bullet$ |
| 250 | FA | . |
| 251 | FB | $\sqrt{\ }$ |
| 252 | FC | $^n$ |
| 253 | FD | $^2$ |
| 254 | FE | ∎ |
| 255 | FF | (blank 'FF') |

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# APPENDIX F. CABLE CONNECTIONS

## Connecting to a Modem

For the Communications Program to operate correctly, certain signals must be present on the cable that connects the Asynchronous Communications Adapter to the host computer or modem. The cable should connect at least the following pins from the connector on your IBM Personal Computer to the connector on the other end (connecting other pins should have no adverse effect):

2, 3, 4, 5, 6, 7, 8, 20, 22

If the Communications Program fails to operate properly with a cable with these pin connections, see the section "I/O Signals used by the Communications Program" in Chapter 10.

The section on "The Asynchronous Communications Adapter" in the IBM Personal Computer *Technical Reference* manual contains more details on the use of these pins.

APPENDIXES

# Connecting by Direct Cable

For connecting two IBM Personal Computers, the following crossover cable can be used:

| Connector 1 Pin | | Connector 2 Pin |
|:---:|:---:|:---:|
| 2 | to | 3 |
| 3 | to | 2 |
| 4 | to | 5 |
| 5 | to | 4 |
| 6 | to | 20 |
| 20 | to | 6 |
| 7 | to | 7 |

The cable must conform to EIA RS-232-C Standards, and either end can go to either computer. The cable must have a 25 pin female subminiature D connector at each end.

Depending on the line speeds and distance, a modem eliminator may be required.

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**IBM**